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SOME FIGURES ON POLIOMYELITIS IN CANADA

R. Kohn

FIRST ADMISSIONS TO MENTAL HOSPITALS

James M. Wanklin, Carol Buck and G. E. Hobbs

BACTERIUM ANITRATUM (B5W) STRAINS ISOLATED IN ONTARIO

Maree A. Simpson and Vera M. Crossley

EFFECT OF INJECTION OF DEXTRAN ON SERUM COMPLEMENT

Christine E. Rice, Paul Boulanger and E. Annau

MEDICAL-DENTAL ASPECTS OF FLUORIDATION

F. McCombie

THE SANITARY INSPECTOR IN FLUORIDATION

Elwood S. Gropp

ENGINEERING ASPECTS OF FLUORIDATION

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VOLUME 45 JUNE, 1954 NUMBER 6

CONTENTS

ARTICLES:

EDITORIAL SECTION:

THE CANADIAN PUBLIC HEALTH ASSOCIATION, 1953-1954 (Part 1):

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Some Figures on Poliomyelitis in Canada

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THIS paper presents a general review of the trend in the incidence of poliomyelitis in Canada, 1924–1953, as reflected in the number of reported cases.

Regarding the nature of the figures given here—and of the charts based on these figures—it should be remembered that they refer to notified cases only; that is, cases contained in the weekly reports from provincial health departments to the Dominion Bureau of Statistics. This is mentioned at the outset in order to emphasize the limitations inherent in data of this nature. These limitations are: incompleteness of reporting and, perhaps still more important, the varying degree of incompleteness in different areas and over a period of time. This variation will, to some extent, affect the trend apparent from the figures: how much, we do not know. It is generally assumed that notification is fairly complete for acute poliomyelitis, more so than for most other communicable diseases (1), but incompleteness must still be considered a major factor in the reporting of non-paralytic cases. Differences between provinces in the ratio of paralytic to non-paralytic cases are a strong indication for that. We find, for instance, in one province less than one per cent of all cases reported as non-paralytic, compared with almost 75 per cent in another. We would be on safer ground if we could confine a statistical analysis of the data to paralytic cases only. This, unfortunately, is not possible for any long-term observations, at least on the national level, because paralytic and non-paralytic cases have been reported separately only since 1949.

Even of cases that are notified, our knowledge is very limited. Only six provinces report cases by sex and by broad age groups. We know nothing about areas within a province where cases occurred, with the exception of some, but not all, cities with over 10,000 population. The fact that we are not able to calculate rates for areas smaller than a province, is bound to blur the picture very considerably. Let us assume, for instance, that there was an

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outbreak of 100 cases in Charlottetown, Prince Edward Island, and another of the same magnitude in Woodstock, Ontario, two communities of approximately the same size. Both are equally significant from an epidemiological point of view but, if expressed in terms of rates for the respective provinces, the outbreak in Charlottetown would result in a rate of 102 per 100,000 in Prince Edward Island, whereas a similar epidemic in Woodstock would show a rate of only 2.2 in Ontario. Furthermore if, for example, there was an outbreak in the neighbouring cities of Ottawa and Hull, its importance would be minimized because half the number of cases would be shown in Ontario, the other half in the Province of Quebec.

All this indicates that totals for provinces do not tell the whole story of the seriousness of the situation within a particular area. They must be interpreted as very rough indications only of the broad regional distribution of the disease in Canada. The figures still show correctly, of course, the case load a provincial health department has to deal with.

Another unknown factor is the old problem of how much of an apparent change is due to a real change in the incidence of poliomyelitis and how much must be ascribed to changes in diagnostic and reporting practices.

Canadian figures do not yet include the Yukon and the Northwest Territories. This is unfortunate because such outbreaks as the one in Chesterfield Inlet (2) and the recent one in the Yukon are not reflected in national figures. All this indicates that there is ample room for improvement in the reporting of poliomyelitis, as of notifiable diseases in general, and that there is a great need for studies within provinces.

The following tables and charts must be interpreted, then, with all these limitations in mind.

Chart 1 shows the number of reported cases of poliomyelitis in Canada. Absolute numbers, though unrelated to the population at risk, still indicate to the health officer the actual size of the problem he has to deal with. They determine the amount of treatment facilities required, the need for preventive measures, the need for hospital beds, respirators, etc. Additional cases have to be provided for, no matter whether caused by increased force of the disease or by increased population.

Apart from a general upward trend, there is not much regularity in this curve. If from the available data we could safely extrapolate below the year 1924 and above 1953, we might perhaps detect three general levels of incidence: the first one up to 1926, the second one up to 1945, and the third beginning with the year 1946. Rising sharply above what might be termed the endemic level of each period are the peak years of epidemics. These seem to have occurred in intervals of from 4 to 6 years before 1946, and in more rapid succession after that year. The rate of increase from one level to another appears to follow a geometric rather than an arithmetic progression. If epidemic outbreaks are included, the increase ratio from the first to the second period is about one-third higher than the ratio from the second to the third period, the respective ratios being 5.3 and 3.8 for the absolute figures, and 4.5 and 3.0 for the rates. If we consider inter-epidemic incidence levels only, i.e. omitting the figures for the years 1931, 1937, 1941, 1952, and 1953, the respective ratios are 3.5

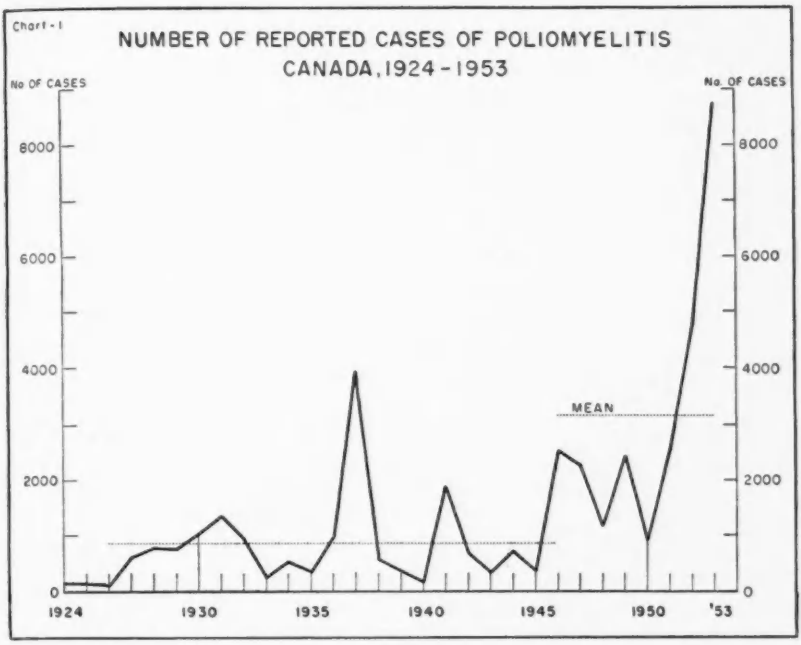

CHART 1.

and 3. Whether the year 1953 is a peak year in one of these cycles or whether the years 1952 and 1953 ushered in a new and higher level of incidence remains to be seen.

Rates show a trend similar to the number of reported cases, with the one notable exception that despite the larger number of cases in 1952, the rate for that year was still lower than the rate for the year 1937.

Corresponding figures for the United States and the United Kingdom also show a general upward trend, in the United Kingdom rather abruptly since 1947, but there is little similarity in the pattern of peak periods.

The upward trend prevails in all provinces, but the peak years vary in different areas. Thus, the high figure for Canada in 1931 was due largely to the epidemic in Quebec, in 1937 it was Ontario that accounted for most of the cases, in 1941 it was Manitoba and New Brunswick; in 1947 several provinces, prominently Ontario and Manitoba, contributed to the high total, and in 1952 as well as in 1953 it was the prairie region which bore the brunt.

A glance at the trend of provincial rates (Chart 2) reveals again a general upward movement, but otherwise there is little similarity, nor does there seem to be any stable pattern anywhere. The chart ends with the year 1953. For the period ending with 1953, it can be said that while the incidence in all western provinces reached new heights in 1952 and 1953, the eastern provinces experienced their highest rates before the year 1952; Quebec and Prince Edward Island reaching their peak in 1946, the other eastern provinces

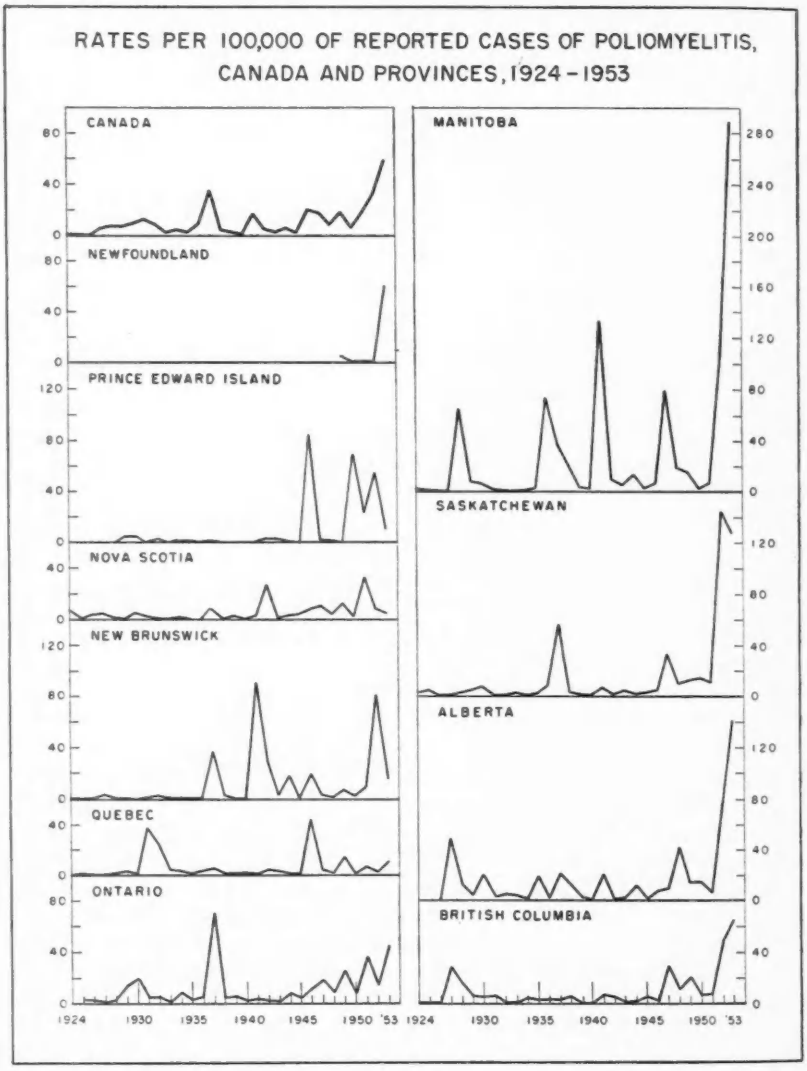

CHART 2.

before that year. In other words, if we consider the Manitoba-Ontario boundary as the dividing line between an eastern and a western area, the totals for the eastern part as a whole have not surpassed the high reached in 1937, i.e. they might be termed stationary in a way, while the figures for the western part are still on the upgrade in 1953. The exception is Newfoundland, with a sudden upward surge of the rate in 1953.

Reported cases in the Maritime Provinces do not show any incidence rates of epidemic proportions before 1941. Manitoba seems to be the hardest hit by epidemic outbreaks, both in terms of frequency and intensity. While in earlier years outbreaks were limited to one or two provinces in any given year, the years since 1946 show peak periods occurring in several provinces in the same year, as epidemics become more frequent and, in the western provinces, more severe. Again, Newfoundland shows a pattern different from the Maritime Provinces.

From looking at the chart one might gain the impression that in earlier years epidemics travelled from west to east over a number of years. Not knowing, however, what lies to the left of 1924, this impression may be fallacious. Perhaps the direction is rather from the south northward. In the United States, the rates used to be higher in the south. This difference has levelled off, however, and in recent years there too rates were high in the western and north central states.

The unsmoothed curves shown in the charts indicate a very consistent zig-zag pattern with cycles from mostly two, but up to four years. For the first time in 1953, the rates remained very high for two consecutive years in several provinces. This makes it still harder to establish any stable pattern and to predict where an epidemic might strike next year.

We find much more consistency, in fact a great deal of it, in the seasonal trend. The peak incidence has fallen invariably within the period from August to October, although in British Columbia the climactic week occurred once in July and once as early as June. There seems to be great uniformity between the seasonal trends in all provinces in any year. In the United States it was found that in the south the epidemic season starts earlier and lasts longer.

In recent years the seasonal curve seems to become more skewed in a positive sense, i.e. it subsides more slowly than it rises. We recall how long the epidemic lingered in the western provinces last year, and again in 1953, particularly in Alberta and British Columbia. Chart 3 gives some idea of the seasonal trend. Figures for 1953, however, are preliminary and subject to amendment. Because of their consistency, seasonal trends have been used to forecast the future course of beginning epidemics (3). The chart shows the number of cases in 1953 compared with the one for 1952, and the median for the years 1948–1952. Provincial figures indicate that only in the Maritime Provinces and Saskatchewan the 1953 line does not top the other two.

Now a few observations on age and sex differentials. In this respect our information is very limited. Age and sex are reported only by six provinces (Newfoundland, New Brunswick, Manitoba, Saskatchewan, Alberta, British Columbia) and only since 1942, usually with a number of cases with age, sex, or both unspecified. More complete information regarding age and sex is available from mortality statistics. As the number of deaths is small, the trend is very erratic.

Observations are further limited by the fact that for notified cases the age is given in broad groups only, the highest comprising twenty years and all ages above that.

No longer do we hear the term "infantile paralysis", perhaps as a result of

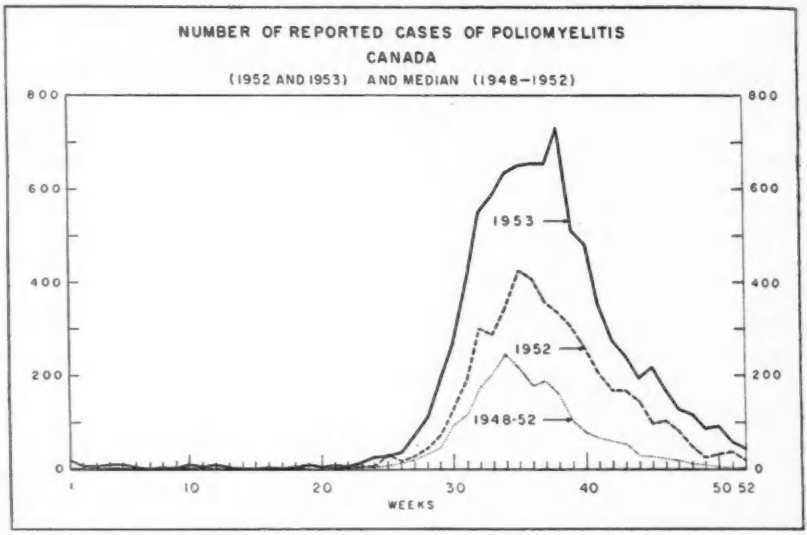

CHART 3.

the trend towards higher incidence among older age groups. Whereas in 1942, about 80% of the cases occurred under the age of 15 years, the percentage was down to about 60% in 1952. The percentage of deaths in the older age groups is still higher than the percentage of cases. The same trend has been observed in the United Kingdom. There, as pointed out before, the incidence rose suddenly and sharply in 1947 over the previous low endemic level, and the opinion has been advanced that epidemic poliomyelitis constitutes a new disease altogether immunogenically (4). It has also been observed that the older age groups were hardest hit by paralysis as well as death (5, 6).

Looking at the age group 20 and over, we find in Chart 4 that the percentage of deaths accounted for by this age group is generally on the upgrade. The trend in the proportion of cases among the older age groups is still more pronounced, at least for the years for which data are available. The sharp drop in 1951 may be a chance occurrence due to the comparatively low figures for that year in the reporting provinces. Again, the proportion of deaths at these ages remains higher than the proportion of cases. The asterisks in the chart indicate the peak years in the unsmoothed curve. From this it would appear that epidemicity has no effect on the age distribution of cases for this age group. As far as the deaths go, the proportion in the older age group seems to be lower in years of epidemics. But this may not be sufficient evidence to say that there exists a real difference in this respect between epidemic and inter-epidemic periods.

The trend towards the older age groups holds for both sexes and is not due to an increase of the proportion of these groups in the general population, where the proportion has remained fairly constant since 1942.

Speaking of cases, the proportion in the group 20 years and over has been

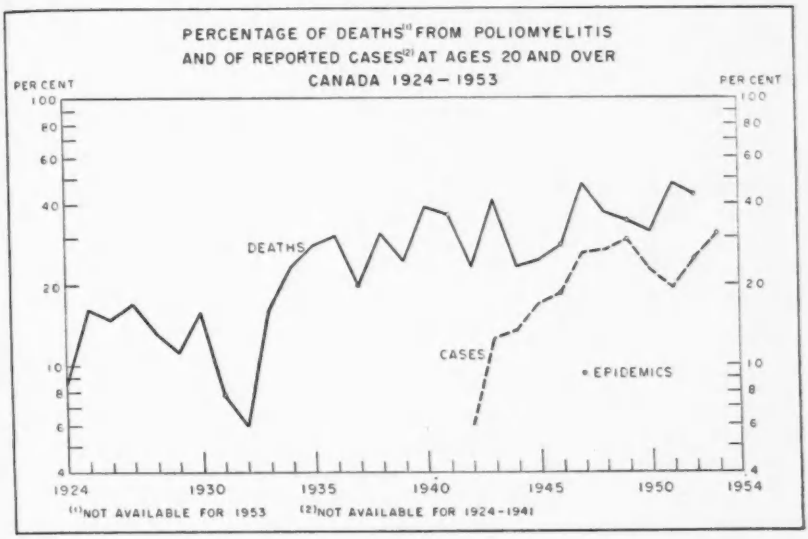

CHART 4.

fairly consistently and markedly higher for males than for females. When observing the deaths, the numbers broken down by sex become very small, and no such clear-cut difference is apparent. If there is any real difference at all, it would seem that the proportion is higher for males than for females.

One bright aspect about the disease is that, apart from epidemic years, the death rate shows a downward trend. Also diminishing, generally speaking, is the case-fatality rate. Figures show a lower case-fatality rate during epidemics, but reporting practices may have something to do with that, because during epidemics, with the general publicity and fear, many borderline or suspected cases may be reported which in other years would go unreported.

Data on the distribution of paralytic and non-paralytic cases are very limited. Only since 1949 do the weekly reports give a breakdown into these two types, again with a proportion of unspecified cases.

As mentioned before, the proportion of each type varies considerably between provinces, indicating that the figures are not very reliable. The overall ratio for Canada of notified paralytic over non-paralytic cases is 1.3, or there are about one-third more paralytic cases reported that non-paralytic. Emphasis is on the word "reported" because it may be assumed that reporting is more complete for paralytic cases than it is for non-paralytic. The ratio is slightly higher for males under one year and between 15 and 19; it is slightly higher for females between 1 and 14 years; it is the same for both sexes at the ages of 20 and over. For all ages, the ratio is 1.2 for males and 1.3 for females. The ratio is lowest (1.2 and 1.0 respectively) for the age groups 1–4 and 5–14 years; it is highest (1.7) for infants under 1 year and the "20 years and over" group. Seasonal variations in this ratio have also been observed (6).

The number of all cases has been consistently higher among males than

among females. This difference, however, has been levelling off somewhat in recent years, and applies largely to the ages under 20.

The age group 5–14 still accounts for the highest number of cases.

The question comes up time and again as to the relative importance of poliomyelitis—relative in relation to other diseases. This question is hard to answer. It has been said that its importance has been over-emphasized in view of the small number of deaths. On the other hand, it is said to be unduly neglected when one considers its crippling effects and its uncontrolled rise. It has been estimated that there are about 80,000 people in the United States under the age of 21 who were crippled by the disease, this figure being 50% higher than the one for 1940 (7). If a relative ranking of diseases is useful at all—and it probably is for the administrator in apportioning funds and efforts— it would have to be based on a composite index reflecting several components:

1. Number of cases (incidence and/or prevalence).
2. Case-fatality rate (taking into account the varying time lag of different diseases between onset and death).
3. Age at death (life years lost, etc.).
4. Duration and degree of disability.
5. Treatment required (hospitalization, etc.).
6. Epidemicity.

Effectiveness of control measures might also be added. If such an index was worthwhile, it should be possible to agree on a scale for each of the components and on the weights to be assigned to them. Then we could establish with some measure of objectivity the relative importance of poliomyelitis as well as other diseases which at present are underrated in some respects and overrated in others.

Figures now obtained nationally from notifiable-disease reports will have to be supplemented by a wide range of studies to clarify the many aspects not revealed by routine reporting in its present form. In most provinces more detailed information—such as age, sex, local area—is already contained on the report forms completed by physicians. Until such data become available for the whole of Canada, it can only be urged that studies be undertaken within provinces.

After presenting a rather gloomy picture of the recent trend of poliomyelitis, it may be well to conclude on a more optimistic note. We have as yet no definite measure of the effects of gamma globulin. The Minister of National Health and Welfare has recently referred to the "exciting developments" in the field. The news emanating from the Connaught Medical Research Laboratories, that it is possible to produce the virus in quantity, now gives new hope that in a not too distant future an effective vaccine will reduce poliomyelitis to a position where a single case of the disease will create as much alarm and sensation as would a case of smallpox today.

ACKNOWLEDGMENT

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APPENDIX

TABLE I

PERCENTAGE OF DEATHS FROM POLIOMYELITIS AND OF REPORTED CASES, AT AGES 20 AND OVER
CANADA, 1924–1953 (1)

Year	Deaths	Cases
1924	8.5	—
1925	16.3	—
1926	15.1	—
1927	17.1	—
1928	13.2	—
1929	11.3	—
1930	15.9	—
1931	7.8	—
1932	6.0	—
1933	16.4	—
1934	23.9	—
1935	28.2	—
1936	30.9	—
1937	20.0	—
1938	31.2	—
1939	25.1	—
1940	39.6	—
1941	36.9	—
1942	23.5	5.9
1943	42.3	12.8
1944	23.7	13.8
1945	25.1	17.0
1946	28.5	18.8
1947	48.9	26.6
1948	37.8	27.1
1949	34.9	29.9
1950	31.7	23.0
1951	48.7	19.6
1952	44.4	25.3
1953		31.6

(1) Cases not available by age for years previous to 1942. Deaths not available for 1953.

TABLE II

NUMBER OF REPORTED CASES OF POLIOMYELITIS, CANADA, AND RATES PER 100,000 OF REPORTED CASES, CANADA AND PROVINCES, 1924–1953

Year	No. of reported cases	Rates per 100,000 population									
	Canada	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
1924	158	1.7	..	..	7.6	0.8	0.2	..	2.4	3.2	11.1	0.9
1925	159	1.7	..	..	1.2	0.3	0.8	2.7	0.9	4.7	..	0.5
1926	113	1.2	..	..	3.9	0.8	0.3	2.2	0.8	0.4	0.3	0.5
1927	609	6.3	..	..	5.0	4.0	0.4	1.6	0.9	1.0	48.8	29.2
1928	787	8.0	..	..	1.9	1.2	1.4	2.6	65.4	2.9	13.7	15.9
1929	770	7.7	..	4.5	0.6	1.2	3.2	14.8	8.1	5.1	4.5	6.5
1930	1,027	10.1	..	4.5	5.4	0.2	1.1	19.8	6.5	7.8	20.3	5.0
1931	1,342	12.9	..	—	2.5	1.5	37.5	4.7	2.1	0.5	3.1	6.1
1932	956	9.1	..	2.2	0.8	3.1	24.2	5.0	1.0	0.6	4.7	0.7
1933	255	2.4	..	—	0.4	1.2	4.2	1.5	1.0	3.0	4.1	0.7
1934	520	4.8	..	1.1	1.9	0.7	3.8	9.2	1.4	1.3	1.5	4.4
1935	363	3.4	..	1.1	0.4	0.7	1.0	3.0	3.4	2.3	19.9	2.7
1936	978	8.9	..	—	—	0.7	3.9	5.8	73.8	8.3	2.1	3.6
1937	3,905	35.4	..	1.1	7.8	37.5	5.5	70.0	37.3	56.3	21.5	3.4
1938	577	5.2	..	—	0.9	3.8	1.7	4.4	22.2	3.7	13.3	5.5
1939	359	3.2	..	—	3.6	0.4	1.8	5.8	3.6	1.2	3.1	0.1
1940	192	1.7	..	—	0.4	0.2	2.0	2.4	2.5	1.0	0.3	0.6
1941	1,881	16.4	..	—	3.3	91.7	1.4	3.8	132.7	6.6	20.9	7.1
1942	687	5.9	..	3.3	27.6	29.1	4.5	2.4	9.9	1.8	1.0	5.4
1943	327	2.8	..	3.3	1.5	3.9	3.3	2.1	5.3	4.4	2.5	0.9
1944	722	6.1	..	1.1	3.3	18.4	1.3	8.5	13.6	2.0	12.0	2.0
1945	384	3.2	..	—	4.2	1.5	1.6	4.6	3.3	2.4	1.7	5.5
1946	2,527	20.6	..	85.1	8.1	19.7	44.4	12.7	6.6	4.4	8.5	2.1
1947	2,291	18.3	..	2.1	11.5	4.1	3.9	19.1	79.4	33.1	9.9	29.9
1948	1,168	9.1	..	1.1	4.6	2.0	1.2	8.7	19.0	10.0	42.0	11.6
1949	2,458	18.3	5.8+	—	13.5	7.9	15.1	26.0	15.7	13.3	14.6	20.6
1950	911	6.7	0.9	69.8	2.7	2.9	1.9	8.4	2.9	14.4	15.1	6.7
1951	2,568	18.4	1.4	23.5	33.6	9.9	6.8	37.0	7.1	11.1	6.3	7.9
1952	4,755	33.0	1.1	55.3	8.7	81.2	3.0	14.8	105.1	142.9	76.3	49.7
1953*	8,754	59.3	60.8	10.4	4.7	16.4	11.4	45.7	289.2	128.0	141.4	64.8

*—Preliminary figures.
+—From July 1949.

	Year	Mean	
		Whole period	Except 1931, 1937, 1941, 1952, 1953
Cases:	1924, 1925	159	159
	1926–1945	838	566
	1946–1953	3,179	1,987
Rates:	1924, 1925	1.7	1.7
	1926–1945	7.7	5.3
	1946–1953	23.0	15.2

TABLE III

NUMBER OF REPORTED CASES OF POLIOMYELITIS (1952 AND 1953) AND MEDIAN (1948–1952)
CANADA

Week	1953*	1952	Median 1948–52
1	20	1	3
2	9	1	1
3	9	3	3
4	11	3	3
5	12	2	3
6	6	3	1
7	2	—	1
8	6	2	–
9	3	4	2
10	10	2	1
11	6	2	1
12	11	2	1
13	7	1	1
14	2	–	3
15	–	2	1
16	4	1	–
17	2	1	1
18	3	6	5
19	10	–	1
20	5	2	2
21	9	2	2
22	8	3	2
23	16	9	5
24	26	8	6
25	29	31	10
26	36	18	15
27	73	29	22
28	113	47	34
29	187	74	48
30	270	132	95
31	403	190	119
32	552	301	175
33	585	287	204
34	635	349	247
35	652	426	218
36	654	408	178
37	654	358	189
38	731	337	162
39	512	305	104
40	483	257	80
41	357	208	68
42	275	169	62
43	242	169	56
44	195	147	31
45	218	98	28
46	171	105	23
47	129	82	20
48	118	49	13
49	87	27	11
50	91	33	5
51	60	39	6
52	45	20	4

* Preliminary figures.

Medical-Dental Aspects of Fluoridation

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BEFORE reviewing the magnitude of the benefits possible by fluoridation, I believe we should examine the extent of the present problem of dental ill-health across Canada.

First of all, there are today only enough dentists to provide adequate dental treatment to about one-quarter of the people in Canada. The National Sickness Survey of Canada in 1950–1951 revealed that less than one-third of Canadian families received dental treatment during that year.

During the recent world war, it was the endeavour of the Canadian Armed Services to provide one dental officer to every 500 personnel. Today in Canada, with approximately 5,215 dentists serving a population of over fourteen million, the ratio is about one dentist to every 2,770 people. Furthermore, the situation is not improving. The total of new dental graduates required each year to replace dentists lost by death and retirement, plus the additional dentists needed to maintain the present ratio of dentists to population in our rapidly growing country, is greater than the present yearly maximum of 202 graduates from the five Canadian dental schools. In addition, it has been estimated that 90 per cent of the dentists in Canada are practising in the urban centres, with a resulting acute shortage of dentists in the rural communities.

Furthermore, we believe that there is also some connection between the overall shortage of dentists and the difficulty of obtaining adequate dental care for children. The preventive dental services of the health units of British Columbia have disclosed that no less than 81% of the preschool and Grade I children examined had never before visited a dentist. It was also demonstrated that the average three-year-old child has three tooth surfaces requiring restoration, the average four- or five-year-old has five, and the average six-year-old has seven to eight surfaces to be restored. In viewing the situation in Canada as a whole, it is estimated that the average fourteen-year-old youth has no less than twelve carious cavities in his permanent teeth. It has been estimated that to provide dental care for the children of Canada between three and fourteen years of age would require half again as many dentists, all working full time on this group alone for the first year.

The beneficial results of fluorides have often been described in terms of a reduction in dental decay of at least 65%. Stratford, Ontario, which has had

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1.3 parts per million of fluoride in its water for the past thirty-five years, demonstrates this fact. There, the average 6–8-year-old child has only two foundation teeth decayed, and the average 12–14-year-old child only three permanent teeth affected by decay. It must be appreciated that the total reduction in carious activity is likely very much greater than the figure of 65% would indicate. In a fluoride area, a tooth is recorded as carious if there is a small pit or fissure in which a dental probe sticks. In a non-fluoride area, a tooth with a wide open cavity, requiring extraction, is similarly recorded as a carious tooth. Yet the often-quoted figure of 65% reduction refers only to the reduction of total number of decayed, missing and filled teeth, and not to the actual amount of decay. It is the impression of dentists who have examined children in the fluoride areas that the cavities are usually smaller, and the advance of the carious process is much slower. In addition, there is a decreased loss of deciduous teeth. As a result, one can anticipate that better dental arches will result and fewer irregularities of the teeth will develop. This aspect is important not only from an aesthetic viewpoint, but also because these conditions in later life prejudice the patient to peridontal disease (pyorrhoea).

Fluoridation enables us for the first time to forsee the possibility of being able to provide dental care for all the children of Canada. It is estimated that to maintain the children age 3 to 19 in dental health (and these represent almost 30% of the population) would require only 25% of the total available time of all the dentists in Canada if all communal water supplies were fluoridated. Never before has it been possible to forsee that all these children could, under any programme of dental care, receive the treatment they so urgently need.

The long-term benefits of fluoridation are not confined to children. One study of adults in a fluoride area reveals that no less than 26% of the 20–24-year-old group born and raised in the area are caries-free. Throughout the age groups 20–44 each group has 60% less dental decay than similar persons in a non-fluoride area. Furthermore, this study disclosed that the people of fluoride-free areas had lost four times as many teeth through decay as those who had always lived in communities with an adequate fluoride content in the water supply.

We are often asked why water is the best vehicle for conveying this benefit to people. Firstly, it may be explained that the caries-inhibitory action of the fluoride ion was first discovered and later investigated in localities where it occurred naturally in the water. It was therefore logical to supplement waters deficient in fluoride content by making use of the procedures available for other phases of water treatment. In addition, the intake of water by humans, though sometimes irregular, is stated to be less variable than the intake of any other single item in human nutrition. The intake of such foods as bread and milk is extremely variable. Another suggestion has been to incorporate fluoride in table salt. However, table salt with a uniform fluoride content might not be desirable when the widely varying fluoride content of natural water supplies is considered. It would be necessary for manufacturers to produce table salt with different fluoride content according to the areas in which it was to be sold.

It must be appreciated that years of further research and experimentation

would be necessary to determine the optimum dosage by any of these methods and to prove their efficiency, which in any case is doubtful. In contrast to these unproven methods, we have today a proven method of reducing the incidence of dental decay by the use of fluoridated water.

It has been suggested that water so treated is largely "wasted" by industry or irrigation. It can also be claimed that chlorinated water is similarly "wasted", but nevertheless chlorination still remains the most practical and efficient method of preventing water-borne disease. Similarly, controlled fluoridation is today the most practical and efficient method of preventing the scourge of dental decay.

We are also asked how we know that fluoridation is safe. Perhaps it is not generally realized that fluorides are a nutrient element of many of our common foods, including such items as fruits, vegetables, meat, fish, tea, cereals and milk. Normally, some four times as much fluoride is consumed from fluoridated water as from the usual foods. We can confidently state that fluoridated water at the recommended concentration has no ill effects. We can point out that over three and a half million citizens of the United States alone have for years drunk water containing not less than 0.9 p.p.m. and up to 5 p.p.m. of fluorides. The records of these communities have been most carefully studied. Special medical examinations of the children have been carried out, but no evidence has been found of any greater incidence in these communities of cancer, kidney disorders, hardening of the arteries and heart disease, rheumatism, arthritis, bone fractures, or any other systemic condition. It is also interesting to note the following statement in the report of the United Kingdom Mission, appointed by the Ministry of Health to study fluoridation of domestic water supplies in North America:

"The proving of a negative is extremely difficult. Meanwhile we are impressed by the fact that millions of people are living in ordinary good health on waters containing fluorides at levels of 1 p.p.m. or more."

Extravagant claims have been made that the procedure itself is potentially dangerous in that more than the recommended dosage of fluoride might inadvertently be added to the community water supply. Continual dosages over a span of many years of at least five times the recommended controlled amount of fluoride would need to be added before the slightest chance of general ill-effect could possibly be expected. Even then, it is not known if ill effects would occur, so great is the safety factor. Fluoridation machines are usually constructed so that there is a possible variation of only 1/20th of the correct amount of fluoride being added to the water. Furthermore, routine tests are regularly taken by the waterworks and health department personnel to ensure that the water contains the recommended proportion of fluorides, no more and no less.

In conclusion, it can be stated with all confidence that today no valid scientific argument is left against fluoridation.

It is therefore suggested that public health workers of Canada have a duty to perform in explaining to the people the enormous and, at the same time, terrifying problem of dental ill-health as it faces us today, with its resultant ill effects on the health of our children, and to inform the people how this problem may be overcome by fluoridation.

The Sanitary Inspector's Role in Water Fluoridation

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TO say that fluoridation is a timely topic would be an understatement. Within the next few years public health officials in Canada will be spending a considerable amount of time, thought and energy in advancing the cause of fluoridation for its value as a public health measure.

The die for this action was cast at the American Public Health Association's annual meeting held in St. Louis in November 1950, when the following resolution was passed:

"Whereas accumulated evidence indicates a sound basis for the fluoridation of public water supplies for the partial control of dental caries.

"Therefore be it resolved that this procedure be recommended as a safe and effective method for reducing the prevalence of dental caries."

Similar endorsations were made by the Canadian Public Health Association, the Canadian Dental Association, the British Columbia Dental Association, and many other responsible authorities.

Today the fluoridation of water supplies is accepted by public health authorities as a public health procedure for the partial control of dental caries. This program has passed from the research stages of development through large-scale demonstration projects such as that in Brantford, Ontario, and is now accepted on a wide-spread empirical basis.

As of May 1, 1953, according to figures of the U.S. Public Health Service, 14,300,000 American people in 767 communities serviced by 407 separate water supplies were using fluoridated water. In addition, there were 15,800,000 persons serviced by 353 water supplies where fluoridation has been approved but not yet begun. This does not include another three and a half million using water supplies in which fluorine is a natural constituent.

While the totals of these figures are impressive, they presage just the beginning of the task which lies before us in the development of total fluoridation of public water supplies. This is one of the newer phases of public health practice which will take considerable diplomacy to develop. Team work and leadership will be required if we are to reach our objective. The sanitary inspector, the health officer, the dentist, the engineer, the public health nurse, and the health educator will have to work together as a team. The sanitary

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inspector, I feel sure, will be able to give a degree of leadership in this program, for he has a good background in public health and is respected for his sound judgment in dealing with problems of environmental sanitation. He is also a good public relations man.

I have often likened myself and my associates to salesmen of public health, who have good products to sell, and who are doing a good job of selling. Pasteurization of milk supplies, chlorination of water supplies, restaurant and food sanitation, housing, rodent and pest control programs, community garbage and sewage disposal, are some phases of environmental sanitation improvements which we have helped to develop and which make for a cleaner and more healthful community. We have now undertaken to sell another public health product—fluoridation.

We as sanitary inspectors must familiarize ourselves with all the aspects of fluoridation. The sanitarian will have a definite role to serve in a fluoridation promotion program. In the initial or planning phases he should be prepared to take part in speakers' bureaus presenting informative talks to service clubs, Chamber of Commerce groups, and Parent-Teacher associations. It is imperative that the sanitary inspectors take part in such community matters; by doing so, we will be in a better position to obtain endorsement from these groups, which is very important in gaining community acceptance of fluoridation.

After the fluoridation equipment has been installed by the engineer, sanitarians will be required to maintain constant check and supervision over these installations, similar to what we are doing with chlorination equipment. This will involve the checking of equipment and charts to determine the flow and rate of chemical being used and the making of tests for the fluoride content of the water, to see that the proper amount of fluoride ion is being added. We shall have to see that the chemical is properly stored and the containers are disposed of in the recommended manner. The problem associated with the handling of the chemical will need to be kept in mind, as this is a matter of industrial hygiene.

Engineering Aspects of Fluoridation

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IN many phases of the health program the public health engineer is called upon to cooperate with other health personnel in promoting public health enterprises. Fluoridation is one such enterprise. For many years the engineer has utilized his skills in the design and operation of water treatment plants. Many communities are now using water supplies they would not have been able to use were it not for the addition of chemicals to the raw water. Other communities with waters of mediocre quality have been provided with an improved product as the result of treatment plant operation. A partial check of available literature indicates that over forty different chemical compounds are being used in the treatment of water supplies.

Medical and dental authorities tell us that the addition of fluoride ion to public water supplies lacking this constituent will result in a significant reduction of dental caries in persons who have been drinking the water since early childhood. As fluoridation is part of the public health program, fluoridation of any specific water supply will be started by local health officials, supported by medical and dental groups, civic organizations, the general public, and the Provincial department of health. The engineer's chief concern is to cooperate when the fluoridation of a supply has been authorized. He is interested in the physical and economic aspects of plant installation as well as the practical problems involved in the control of fluoridation and the handling of materials used in the process.

Selection of Equipment

Selection of the most satisfactory method of fluoridation for any community depends upon many factors, the more important of which are: the quantity of water to be treated, the chemical form of fluoride to be used, the hydraulics of the water supply system, the space available for the equipment and storage of chemicals, the quality of operating personnel available, and lastly, the regulations of local and provincial health departments. Fluoridation may be adapted to both the large and small community. Norwood Village, Washington, with a population of approximately 100 persons, is an example of a small community that provides its inhabitants with fluoridated water.

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Chemical Feeders

The equipment used in fluoridation may be classified as either solution or dry feeders. Solution feeders are essentially small, accurate pumps that deliver a measured quantity of prepared solution during a specified time. The concentration of the solution and the controls on the feeder can be adjusted to meet the needs of communities using up to 0.5 mgd. Dry chemicals feeders are designated as volumetric or gravimetric. Volumetric feeders are generally used for water supplies delivering between 0.5 and 2.5 mgd. Gravimetric feeders are generally used where the flow of water is over 2.5 mgd. Dry feeders deliver a measured amount of fluoride chemical in proportion to the flow of the water supply being treated. After dropping into the dissolver tank below the dry feeder, the chemical is transported to the application point in the water supply system by one of two means, gravity or the use of a small pump. The ideal installation is one that combines simplicity and economy with efficiency of operation.

For pumped water supplies with constant pumping rates, the use of constant rate feeders that are synchronized with pump operation is indicated. For systems in which the flow of water varies significantly, flow proportioning feeders utilizing automatically operating auxiliary equipment should be used.

Auxiliary Equipment

Auxiliary equipment at a fluoridation plant treating variable flows will include a main line meter and electrical recorders, the meter to actuate both the recorders and the device used to pace the chemical feeder. The recorders will totalize, indicate, and record the water flow in the main as well as the rate of feed of chemical from the feeder.

Storage Space

Adequate storage space for chemicals can be provided for at the plant when type and consumption of chemical, as well as the size and shape of chemical containers, are known. The storage space should be conveniently located with respect to the feeder, and storage should not be directly on a floor laid on the ground if powdered chemicals are used at the plant, as these chemicals are slightly hygroscopic. If sodium silicofluoride is used, a 30 by 48 inch pallet, having a platform height of 12 inches and holding 24 one-hundred pound sacks, 6 sacks high, would have a total height from the floor of 48 inches. For a community using an average of 1 mgd, this supply of chemical would last 144 days.

Disposal of Sacks

Disposal of sacks by incineration appears to be the best method, although burial in a sanitary landfill would be satisfactory provided that fluoride dust was not allowed to come in contact with those persons handling the containers. Since hydrogen fluoride in the smoke can cause damage to vegetation located in the vicinity of the incinerator, the hydrogen fluoride concentration in the atmosphere should be kept to a minimum by removing as much dust as possible from the sacks, by using short burning periods, and by doing the burning during favorable wind conditions.

Dust Control and Laboratory Facilities

The requirement for dust control equipment and laboratory facilities will vary with the type and size of fluoridation plant. In addition to fluoride testing equipment, the laboratory facilities should include a basin, work table, and cupboard, with a return sampling line from the main containing the fluoridated water to the tap at the basin.

Incrustation Problem

For installations delivering sodium fluoride solution to a conduit under pressure, incrustation of delivery equipment by calcium and magnesium fluoride can be prevented by softening the dissolver tank feed water by the zeolite process or by treating the feed water with a sequestering agent such as sodium hexametaphosphate which will inactivate the metallic ions. Plants using sodium silicofluoride are not apt to have a build-up of incrustants, as calcium and magnesium do not as readily form a precipitate in silicofluoride solution.

Chemicals

Five chemicals have been used to date in water fluoridation: sodium fluoride, sodium silicofluoride, ammonium silicofluoride, hydrofluosilicic acid, and hydrofluoric acid. The first two of these compounds are most commonly used. Both sodium fluoride and sodium silicofluoride are powders, and both are suitable for use in dry feed equipment. Sodium fluoride is often dissolved in water and then used in conjunction with solution feed devices. Sodium silicofluoride has the advantage of low cost and is used where possible for this reason. Its use is restricted largely to dry feed equipment, because of its low solubility in water.

The use of ammonium silicofluoride is acceptable provided that it is not added to a water supply which is also chlorinated. If proper materials are available for handling hydrofluosilicic acid, its use is especially suited where simplicity of operation is desired and space for equipment is at a premium. Madison, Wisconsin, appears to be the only city mentioned in the literature as using hydrofluoric acid. The use of hydrofluoric acid is not recommended in preference to other chemicals because it is extremely corrosive and very hard to handle.

Costs

Costs may be greatly influenced by local conditions. A reliable estimate requires an exacting review of the water supply system and discussion with the water supply officials concerned. The costs of fluoridation depend on the natural fluoride content of the water, the concentration of the fluoride desired, the choice of chemical, the amount of water used by the community, the type and number of units of feeding equipment used, the auxiliary equipment required and, lastly, the availability of housing for feeding equipment and chemical storage. Costs may be divided roughly into five increments: (1) chemicals, (2) equipment, accessories and installation, (3) plant construction and

engineering, (4) maintenance and miscellaneous expense, and (5) labour, laboratory control and supervision.

Where suitable housing is already available, solution feed equipment may be bought and installed complete with piping and necessary control equipment, at a cost between $700 and $2,500, depending on the considerations mentioned above. The equipment and structural costs for a volumetric feeder installation vary between $2,500 and $4,000, where suitable housing already exists. For the larger water supply systems where gravimetric feeders are necessary, the installation costs are in the neighbourhood of $4,000 to $6,000 where housing is already available.

As sodium fluoride and sodium silicofluoride are the chemical compounds most commonly used, it is desirable to know the costs of these chemicals for the fluoridation process. At 22c a pound the cost of sufficient sodium fluoride to treat 1 million Imperial gallons of water would be $5.12, based on a chemical purity of 95%. If 98.8% pure sodium silicofluoride costs 9c per pound, the required expenditure to treat one million Imperial gallons using this chemical would be $1.50. The actual daily cost of chemical for treating a given water supply can be readily determined by multiplying the cost per million gallons by the flow in mgd.

Fluoridation Control

For proper control of the fluoridation procedure, routine colorimetric tests for the determination of the fluoride ion should be carried out by operating personnel. The tests most commonly used for the determination of the fluoride ion in water are based on the Sanchis-Scott procedure, which is the method officially accepted by the American Public Health Association and the American Water Works Association. In this test zirconium-alizarin reagent is added to samples obtained from various points in the distribution system. The color of the red zirconium-alizarin lake is reduced in proportion to the concentration of fluoride present. The result is a decrease in the red coloration with simultaneous increase of yellow. The color of the sample is then matched with a series of solution color standards which are prepared at the time the test is being made, or the sample may be matched with the already prepared color standards of commercial testing apparatus.

An additional check may be used to control the fluoridation procedure and determine how closely the desired treatment has been adhered to. The amount of fluoride used in the chemical feeding process should be compared with the water consumption of the community as recorded by the electrical recording apparatus. The average results of this comparison should yield the same answer as the average of the results of the colorimetric test for the fluoride ion.

Dust Control

The requirements for dust control equipment and protective devices will vary with the type and size of fluoridation plant. At all installations protective equipment for the operator is necessary. This protective equipment will include an approved mask and filter, goggles, rubber apron or overalls, and gloves with

gauntlets. The types of mask and filter recommended are those designated by the U.S. Bureau of Mines as BM2101 and BM2133, respectively.

As fluoride dust is a toxic material, industrial hygienists have set the maximum allowable concentration of the dust at 2.5 milligrams per cubic metre of air based on a continuous 8-hour day exposure for a 5-day week. For large installations dust collectors vented to the outside atmosphere should be provided for at the chemical filling hopper of the feeder. These dust collectors should be constructed so that they will provide an inward velocity of at least 200 feet per minute through the hopper opening during the filling process, and should be designed to allow the accumulated chemical dust to drop back into the hopper of the feeder when the collector's motor is shut off.

Extensive tests carried out in the States of Wisconsin and New York have indicated that, provided suitable precautions are taken in handling the fluoride chemicals, the maximum allowable concentration of the toxic fluoride dust is not reached in the immediate vicinity of the face of the operator during the hopper filling procedure.

The Trend of First-Admission Rates to Mental Hospitals in Ontario, 1927-1946

(AN ANALYSIS BY AGE, SEX AND DIAGNOSIS)

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I. INTRODUCTION

THIS paper describes first-admission rates to mental hospitals in the Province of Ontario during a 20-year period—1927 to 1946. The rates were compiled as the initial phase of a long-term project designed to apply epidemiological methods to the study of mental illness.

This investigation, rather than being an innovation, is comparable to others conducted in Norway (8), New York State (7), Massachusetts (1), Illinois (10), and for the United States as a whole (9). In each, first admissions were adopted, with varying degrees of reserve, as a measure of the incidence of mental disorder. Where reservation was minimal, inferences concerning etiology were based upon observed correlations between admission rates and social indices.

This approach has been criticized on two counts. First, the submission to mass study of a disease entity whose concomitants are considered to be those of the patient's reaction to his own peculiar environment is thought by some to be predetermined to low productivity. Second, the opinion exists that, while the approach may have merit, first admissions do not accurately reflect the incidence of mental disorder in a population. These critics suggest that factors such as variations in both the availability of hospital facilities and the amount of social pressure exerted toward the hospitalization of the mentally ill are at least partly responsible for differences in admission rates among social groups and geographical areas.

The first objection is a hollow one. The etiology of most mental disorders is still unknown and all available methods of research should be focussed on the problem. Studies of incidence over a period of time, and from area to area at one point in time, have been productive in the field of communicable disease. More recently this method of investigation has been applied to non-communicable disorders such as cancer (11), pellagra (4), and accidents (5).

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This study was supported by a Mental Health Grant under the National Health Grants, and was carried out at the University of Western Ontario, Faculty of Medicine, London, Ontario, Canada.

It therefore seems reasonable that a study of mental disorder from this point of view could yield positive results. By relating incidence to social and other factors thought to be significant, it might be possible to test some of the still unproven hypotheses that attempt to explain the development of a psychosis in the patient.

The second criticism is not ill-conceived. Obviously, not all of the mentally ill enter a hospital, and, more important, it is unlikely that they enter as a constant proportion from all social groups and geographical areas. In areas where facilities are inadequate, first-admission rates will be artificially low. Barring this limitation, even a superficial examination of the living habits in various groups and areas suggests that in some, because of the attitude toward mental illness and mental hospitals and the lack of availability of home care, the chances of a psychotic's being hospitalized are greater than others.

Currently in this Department, an attempt is being made to assess objectively the possible influence of the above factors on admission rates. This was chosen as an alternative to the complete rejection of first admissions as an index of incidence because this measure is characterized by two admirable qualities not easily duplicated in other methods—objectivity, admittedly artificial, and availability of statistical data, an important consideration in long-term analyses done in retrospect. Finally, a long-term analysis of first-admission rates per se will reflect changes in the demand for hospital care which, when projected into the future, should aid in the planning and administration of mental institutions.

II. Method

The collection of statistical data for a lengthy period from the files and case histories of hospitals scattered throughout the Province would have constituted a long and arduous task. A happy alternative was the possible utilization of the annual reports published by the Hospitals Division of the Ontario Department of Health. This source of information was adopted. A secondary purpose of the study became the assessment of the value and limitations of these reports for a statistical survey.

Social data concerning first admissions, to be adaptable to this survey, had to be published regularly for a period of at least 20 years; have first admissions distinguished from readmissions; be presented by age and sex; and have comparable base population figures given in the Census of Canada so that rates could be calculated.

Unfortunately, it was discovered that the combined limitations of the Provincial Reports and the Census of Canada enabled only the derivation of first-admission rates by age, sex and diagnosis, from the year 1927 onward. Other variables were either not continuously reported or not available for the Census population.

The 20-year period 1927 to 1946 was chosen for analysis, and 45,830 admissions were involved.

Included in the Provincial Reports are admission figures for the 14 hospitals supported by the Province during the period, but excluded are those for a large veterans' hospital and a private sanatorium. Since first admissions to the

sanatorium were comparatively small, it was felt that their omission would not significantly affect the rates; but because the time period included war years, first-admission figures were obtained from the files at the veterans' hospital.

First-admission rates were calculated and expressed as follows:

(*a*) All rates are either age specific or standardized for age.

(*b*) The population of Canada, 1921, was used as the standard population.

(*c*) All rates are expressed per 100,000 of the general population.

(*d*) Diagnostic entities were not analysed separately, but were grouped into a six-fold classification similar to that used by Somner and Harmon (10) for their study in Illinois. This procedure is designed primarily to eliminate differences in diagnostic rates arising from varying diagnostic policies. The more important disorders included under each of the six headings are outlined below:

1. Functional
   (*a*) Schizophrenia
   (*b*) Manic Depressive Psychosis
   (*c*) Involutional Melancholia
   (*d*) Psychoneurosis*
2. Psychosis with Organic Disease
   (*a*) Psychosis with Mental Deficiency
   (*b*) Psychosis with Epilepsy
3. Without Psychosis
   (*a*) Mental Deficiency
   (*b*) Epilepsy
   (*c*) Alcoholism
4. Psychosis due to Alcohol and Drugs
5. Psychosis due to Syphilis
   (*a*) Syphilitic Meningo-Encephalitis
   (*b*) Other Forms of Syphilis
6. Psychosis Associated with Old Age
   (*a*) Senile Psychosis
   (*b*) Psychosis with Cerebral Arteriosclerosis

III. Results

The rates which are given describe the distribution of first admissions by age, sex and diagnostic groups. The review of these rates will include both the year-by-year trends for the whole period and the result of these trends over a decade, as measured by three-year averages of rates about the Census years 1931 and 1941. These average rates, calculated on the most accurate population bases, summarize resultant changes in rates over the ten-year interval and permit calculation of the statistical significance of such changes.

A. *Age Standardized First-Admission Rates, Total and by Sex*

1. Yearly Trend, 1927–1946

(*a*) Total Age Standardized Rates (Table I)

Over the 20-year period a long-term cyclic trend is apparent. There was an increase in rates from 43.0 in 1927 to 69.8 in 1935, a decline to 48.7 in 1944 and, finally, another increase to a rate of 59.3 in 1946.

(*b*) By Sex (Table I, Figure 1)

Throughout the period male rates were, in general, higher than

*Comprises only about 5 per cent of all first admissions and is included in the Functional group because of its apparent psychogenic basis.

TABLE I

STANDARDIZED FIRST-ADMISSION RATES PER 100,000
ONTARIO, 1927–1946

Year	Standardized		
	Male	Female	Total
1927	44.0	42.1	43.0
1928	44.8	42.9	43.7
1929	50.1	50.4	50.2
1930	52.7	47.0	49.9
1931	53.3	47.6	50.6
1932	67.5	54.1	60.9
1933	58.8	56.6	57.9
1934	60.6	55.9	58.2
1935	75.8	63.1	69.8
1936	70.6	54.7	63.2
1937	70.9	59.1	65.4
1938	67.9	59.8	63.8
1939	63.4	57.9	60.7
1940	57.1	51.2	54.3
1941	56.8	55.8	56.3
1942	53.9	51.3	52.6
1943	51.2	53.6	52.2
1944	48.5	49.1	48.7
1945	62.3	53.5	57.9
1946	60.0	58.7	59.3

FIGURE 1

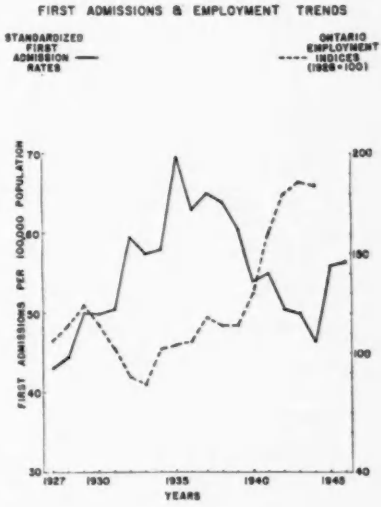

FIGURE 2

female. While sex differences were negligible during the earlier years (1927–1929), the male rate in 1935 (75.8) reached a level far exceeding the female rate of that year (63.1). From 1941 to 1946 sex difference in admission rates was again minimal.

(*c*) In Relation to the Economic Cycle (Figure 2)

As a reasonable measure of economic activity during the period, employment level was chosen. In Figure 2 employment indices for 1927 to 1946* are shown together with the standardized first-admission rates. Some evidence of a negative association between them is apparent.

(*d*) Comparison of Trends in Ontario and Illinois (Figure 3)

Yearly first-admission rates for Illinois, reported by Somner and Harmon (10), pertain to essentially the same time period as ours and so were compared.

Because the Illinois rates were partially age-standardized by limiting the base population to ages 15 and over, their excess over those for Ontario is probably artificial. There is, however, an over-all similarity between the year-by-year trend in rates in the two areas, although the peak rate occurred three years later in Illinois.

2. Three-Year Average Rates, 1930–1932 and 1940–1942, Total and by Sex (Table II)

Table II makes it clear that, in spite of the peak admission level in 1935, the rate for 1940 to 1942 did not differ markedly from that for 1930 to 1932. The female rate was significantly higher in 1942, but rates for the male and the total population were not.

B. *Age Specific Rates*

1. Yearly Trend, 1927–1946

The age curves are arbitrarily spaced on the graph, rather than drawn in correct relationship one to another, for the sake of clarity. For each curve, the rates at the beginning and the end of the period are indicated.

(*a*) Total, Male and Female (Figure 4)

(1) Under 15

Rates for this age group fluctuated considerably from year to year. However, after a sharp increase in 1932 (to 22.6 from 8.7 in 1931), the over-all trend was essentially a level one.

TABLE II

AGE SEX STANDARDIZED FIRST-ADMISSION RATES, ONTARIO
1930–1932; 1940–1942 (3-Year Averages)

Rates Per 100,000

	1930 to 1932	1940 to 1942	Difference in Rates 1940–1942 Minus 1930–1932	Critical Ratio of Differences
Total	53.8	54.8	1.0	1.0*
Male	57.8	56.4	1.4	1.0*
Female	49.6	53.0	3.4	2.4**

*Difference not significant. **Difference significant to 0.05.

*Canada Year Book, 1947, page 613.

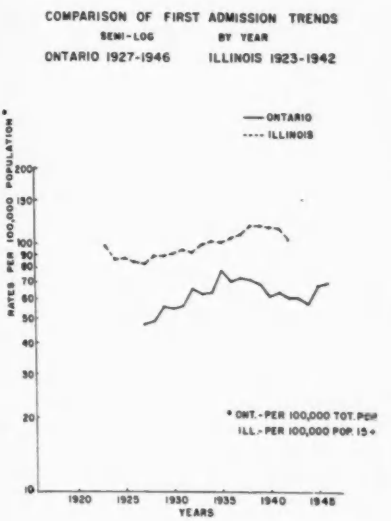

FIGURE 3

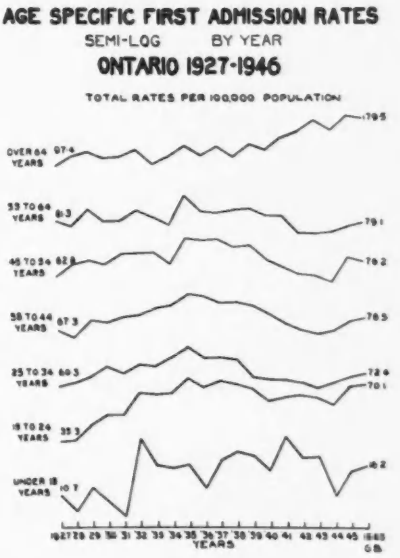

FIGURE 4

(2) Ages 15–24 to 55–64 inclusive

Each of these five age groups was characterized by a long-term cyclic trend in yearly first-admission rates. While rates were, in general, higher in 1946 than in 1927 (especially at ages 15 to 24), the highest rate in each age group occurred in 1935, and in most instances the rate in 1944, before the increases of the next two years, was comparable to that of 1927. Age group 55 to 64 is the only one of the five showing evidence of an over-all downward trend, with a rate in 1946 below that of 1927.

(3) Ages 65 and Over

The first-admission rate increased moderately from 1927 (97.4) to 1938 (113.3). Following 1938 the upward trend was accelerated, resulting in a rate of 179.5 in 1946.

(*b*) By Sex (Figures 5 and 6)

Male age specific rates for age groups 15–24 to 55–64, inclusive, were largely responsible for the cyclic trend of the total standardized rates; the trend of female rates for this segment of the age span was essentially a level one.

The upward trend until 1935 in age group 15 to 24 was somewhat more pronounced in the female rates, while the downward trend in age group 55 to 64 was most evident in the males.

Rates for both sexes increased markedly in age group 65 and over, especially after 1935.

A sharp increase in the rate for ages under 15 in 1931 occurred in both sexes, but during the succeeding years this higher level was maintained by the females more than by the males.

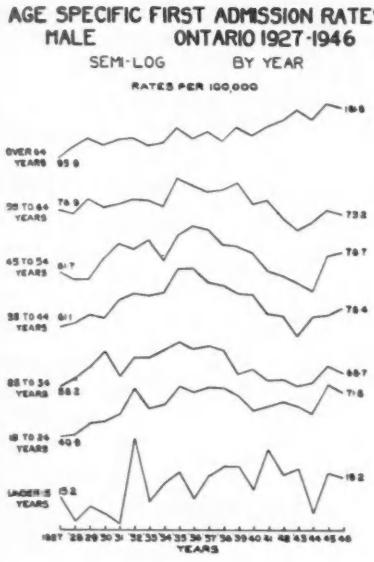

FIGURE 5

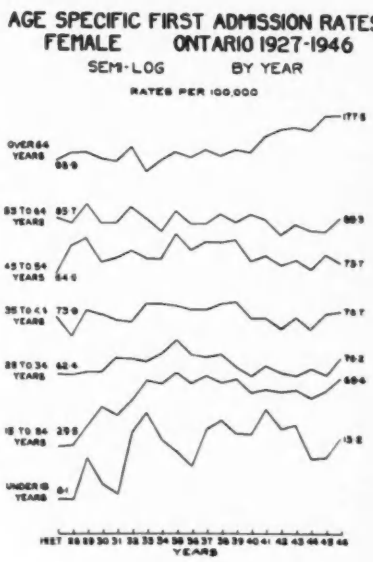

FIGURE 6

In general it may be stated that, with the exception of age group 65 and over, the increases in rates which occurred throughout the age span over the 20-year period were effected primarily by the females and the decreases more notably by the males.

2. A Comparison of the Three-Year Average Rates for 1930–1932 and 1940–1942

Age specific rates calculated as three-year averages around the Census years 1931 and 1941 illustrate: (*a*) the relation between age and first-admission rates at a point in time, and (*b*) the significance of changes in rates within sex and age groups over a 10-year period.

(*a*) The Relation Between Age and First-Admission Rates at a Point in Time (Table III)

Our data confirm observations made by other investigators concerning age-specific curves of first-admission rates. Rates for both sexes rise sharply until age 24, follow an almost level trend, with minor increases, until age 64, and then soar upward.

Comparison of rates by sex shows that male rates are higher than the female at all ages except 45 to 64.

(*b*) The Significance of Changes in Rates within Sex and Age Groups Over a 10-Year Period

Increases occurred only at the extremes of the age span, with the most marked absolute increase in the age group 65 and over. Decreases over the period occurred throughout the age groups 25–34 to 55–64 inclusive, but some of these decreases were not statistically significant. It is clear, however,

TABLE III

AGE SEX SPECIFIC FIRST-ADMISSION RATES, ONTARIO, 1930–1932 AND 1940–1942, 3-YEAR AVERAGES WITH ABSOLUTE AND PERCENT CHANGE IN RATES FROM 1930–1932 AND 1940–1942

Age Group	Age Sex Specific Rates Per 100,000											
	1930–1932 (Average)			1940–1942 (Average)			Absolute Change			Percent Change		
	M	F	T	M	F	T	M	F	T	M	F	T
Under 15	17.9	9.3	13.6	21.1	15.8	18.5	3.2*	6.5	4.9	17.9	72.0	36.0
15–24	60.0	48.2	54.2	60.8	59.3	60.1	0.8*	11.1	5.9	1.3	23.0	10.9
25–34	79.4	72.6	76.1	69.0	65.7	66.4	−10.4	−6.9*	−9.7	−13.1	−9.5	−12.7
35–44	83.2	72.4	77.9	79.2	70.1	74.8	− 4.0*	−2.3*	−3.1*	− 4.8	−3.2	− 4.0
45–54	81.6	79.2	80.5	66.7	76.1	71.3	−14.9	−3.1*	−9.2	−18.3	−3.9	−11.4
55–64	83.8	85.7	84.8	80.7	81.4	81.1	− 3.1*	−4.3*	−3.7*	− 3.7	−5.0	− 4.4
65+	121.5	107.1	114.1	143.2	132.2	137.6	21.7	25.1	23.5	17.9	23.4	20.6

*Difference not significant at 0.05 level.

that such a comparison between two Census periods, although commonly found in the literature as a measure of changes with time, cannot replace the year-by-year study of rates in the analysis of secular trends.

C. *Age Standardized First-Admission Rates by Diagnostic Groups*

1. *Yearly Trend Standardized for Age and Sex (Table IV, Figure 7)*

(*a*) Functional

The admission curve closely resembles that for total first admissions. From a low of 21.3 in 1928, rates increased to 31.0 in 1935. A downward trend following this year ended in 1943 (23.0). Over the 20-year period a moderate over-all upward trend is apparent, e.g., 22.1 in 1927 and 29.3 in 1946.

(*b*) Without Psychosis

Rates were comparatively low up to 1931 (7.3). A sharp rise in 1932 (to 15.8) and more moderate ones in 1935 and 1937 resulted in a peak rate for the latter year (20.3). A downward trend followed to 1944 (10.3). In 1946 the rate had increased to 14.6, but did not approach the high level of 1937.

(*c*) Psychosis Associated with Old Age

Yearly rates, after showing an almost level trend from 1927 (5.8) to 1936 (5.7), rose to 7.8 in 1946.

(*d*) Psychosis with Organic Disease

Rates increased from 1927 (4.8) to 1935 (6.7). A downward trend followed this year and the admission level reached the low point of the 20-year period in 1944 (3.1). In 1946 the rate had increased to 3.8, still slightly lower than that of 1927.

(*e*) Psychosis due to Syphilis

Yearly rates increased from 1927 (2.6) to 1933 (3.8). A downward trend was then in evidence for the rest of the period.

(*f*) Psychosis due to Alcohol and Drugs

The curve is irregular but represents an over-all level trend. A slight peak is, however, noted in 1935 (1.9), a rate not exceeded in any other year of the period.

TABLE IV

AGE SEX STANDARDIZED FIRST-ADMISSION RATES
BY DIAGNOSTIC GROUPS
Ontario, 1927–1946

Year	Functional	Without Psychosis	Old Age	With Organic Disease	Due to Syphilis	Due to Alcohol and Drugs
1927	22.1	6.5	5.8	4.8	2.6	0.8
1928	21.3	7.1	5.0	5.1	2.6	0.9
1929	24.1	7.9	7.0	6.9	2.8	0.9
1930	25.2	7.7	6.0	5.6	3.1	1.2
1931	25.0	7.3	6.3	5.9	3.7	1.5
1932	26.6	15.8	6.1	6.9	3.6	1.0
1933	26.8	13.7	5.4	6.9	3.8	0.9
1934	27.1	13.3	6.0	5.9	3.7	0.8
1935	31.0	18.8	7.0	6.7	3.8	1.9
1936	28.5	18.3	5.7	5.4	3.1	1.3
1937	27.7	20.3	6.6	5.0	3.5	1.1
1938	29.7	19.7	6.2	4.8	3.1	1.3
1939	27.3	16.5	6.8	4.9	3.1	1.4
1940	25.4	13.0	6.6	4.5	2.9	1.2
1941	22.8	16.0	7.0	4.5	2.3	1.1
1942	24.3	13.3	6.0	4.5	1.8	1.4
1943	23.0	13.5	7.7	4.0	2.7	0.7
1944	24.4	10.3	7.2	3.1	2.3	0.8
1945	28.5	14.0	8.6	3.6	2.1	0.9
1946	29.3	14.6	7.8	3.8	1.8	1.5

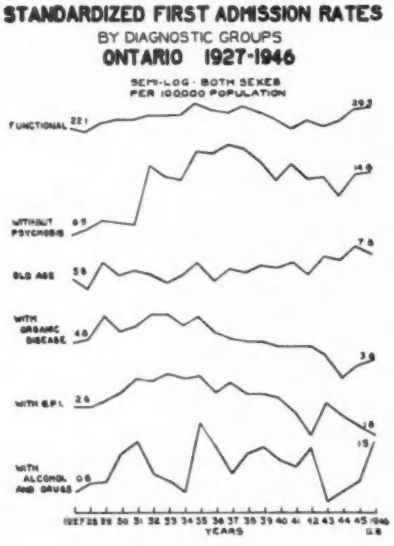

FIGURE 7

2. *Diagnostic Groups by Age*

For the sake of brevity a detailed discussion of diagnostic rates by age will not be given. A few pertinent observations will, however, be made.

It has been shown that certain segments of the age span had characteristic trends over the 20-year period. Specifically, yearly rates for ages 15 to 64 were cyclic, while those for ages 65 and over had an upward trend.

Since ages 15 to 64 are characterized largely by the Functional group of psychoses and ages 65 and over by the psychoses associated with Old Age, it is of some interest to consider whether these trends are a function of the specific psychoses or merely of the particular age group. This can be done by examining in further detail the trends within age groups 55 to 64 and 65 and over, shown in Table V.

TABLE V

AGE SPECIFIC FIRST-ADMISSION RATES PER 100,000
BY CERTAIN DIAGNOSTIC GROUPS, AGES 55 TO 64 AND 65 AND OVER
FOR SELECTED YEARS, 1927–1946

Year	Ages 55 to 64			Ages 65 and Over		
	All Diagnoses	Old Age Diagnostic Group	Other Diagnoses	All Diagnoses	Old Age Diagnostic Group	Other Diagnoses
1927	81.3	24.1	57.2	97.4	82.4	15.0
1932	92.5	21.4	71.1	120.9	92.8	28.1
1937	88.9	23.4	65.5	125.2	102.6	22.6
1942	70.0	13.2	56.8	151.7	104.5	47.2
1946	79.1	12.6	66.5	179.5	145.5	34.0

As mentioned before, total rates for ages 55 to 64 showed a cyclic trend with evidence of an over-all fall in the admission level, while total rates for ages 65 and over increased throughout the 20-year period. Examination of the rates for the Old Age diagnostic group within these two age groups shows that they are characteristic of the age groups' total rates; i.e., falling slightly in age group 55 to 64 and rising sharply in age group 65 and over. This is true also of the combined remaining diagnoses in these age groups.

These observations suggest that changes either in the incidence of mental illness or in the tendency to hospitalize mental patients may be more a function of the age of the individual than of specific diagnostic entities.

IV. DISCUSSION

Probably the most outstanding and certainly the most heartening observation made in this survey is that, when standardized for age, the over-all first-admission rate in Ontario failed to show a consistent increase over the 20-year period. This observation supports the thesis of Elkind and Taylor (3) who, after examining statistical data for New York State (1920 to 1933) and Massachusetts (1917 to 1934), concluded that mental disease is not on the increase. Evidence to the contrary submitted by Malzberg (7) in New York State and Dayton (1) in Massachusetts resulted largely, they think, from the lack of adequate standardization of rates. Dorn (2), too, emphasized that when age-specific rates are examined, increases are not as great as sometimes supposed.

While temporary increases in the admission level are not maintained over

the period, the cyclic effect created by year-to-year fluctuations in rates is notable. It has been shown that the cycle is inversely related to the employment level in the Province, and this relationship has been noted by investigators using data from Massachusetts (1), Illinois (10), New York State (7), and the United States as a whole (9). The possible effect of economic conditions upon admission rates is given further credence by the observation that, in Ontario, it was primarily the wage earners, males ages 15 to 64, who created the cycle in the total rates. However, even if an economic hypothesis is adopted, further investigation will be necessary to determine whether the effect is upon the incidence of mental illness or upon the tendency to admit the mentally ill to hospital.

There is agreement among all investigators that, as in Ontario, the rate for the aged is increasing rapidly. The proportion of the general population in this age group is also increasing; in Ontario, in 1931, 6.9 per cent of the population was over 65 years of age, and in 1941 the percentage had risen to 8.0. Already the age groups 65 and over contribute 20 per cent of all first admissions to hospitals in Ontario and the trends just described point to an even greater proportion during the coming years. Whether the rise in the admission rate reflects an increase in the incidence of mental illness among the aged, or whether it results from a growing lack of ability or desire to care for the aged at home, is a debate for which little objective evidence is available.

Rates by diagnostic groups should be commented upon briefly. The Functional group has by far the highest rate, accounting for approximately one-third of the total number of first admissions and, like the total rates, its trend is cyclic in nature. A time relationship between this cycle and the economic cycle has been observed. Should an etiological relationship be assumed, one might expect that the incidence of the Functional psychoses would be most influenced by economic stress.

The Old Age group of diagnoses shows an upward trend comparable to that for age group 65 and over, in which these diagnoses are most prevalent.

However, admissions in either the Functional or the Old Age diagnostic groups which fall outside of their characteristic age span tend to follow the trend of the particular age group rather than to maintain the trend of the diagnostic group as a whole. This finding may be interpreted in different ways.

The belief that first-admission trends represent real changes in incidence might lead one to the rather untenable conclusion that two quite different combinations of etiological factors, each affecting both Functional and Organic psychoses in the same way, are at work in different age groups.

There is another possible explanation which also permits acceptance of the rates as a measure of real incidence. Accurate diagnosis may be difficult in age groups characterized both by Degenerative and Functional psychoses of frequently similar symptomatology. If this is so, it is possible that a large proportion of the psychoses in the age group 55 to 64 diagnosed as Degenerative psychoses are essentially Functional with superimposed early organic changes, while a comparable proportion of the illnesses called Functional in age group 65 and over are actually organic psychoses of the senium, with schizophrenic or manic-depressive colouring. In other words, the two age groups might be more homogeneous in diagnostic composition than our data indicate. On this

basis one might reason that the so-called Degenerative psychoses of age group 55 to 64 follow the functional trend because they are essentially of psychogenic origin, while the psychoses termed Functional in age group 65 and over are, by comparable reasoning, following the trend of organic mental disease. The opinion that many of the diagnosed Degenerative psychoses of the aged are actually psychogenic in origin has recently been expressed by other writers (6).

However, if one believes that admission trends are primarily a reflection of changes in the tendency to hospitalize the mentally ill, then the likeliest explanation is that socio-economic factors which influence this tendency operate differently in the two age groups. To the writers, at any rate, this latter interpretation is the most convincing, even though objective support is at present lacking.

The sharp increase in the rate for the diagnostic group Without Psychosis which occurred in 1932 is an example of the effect that variations in hospital facilities can have upon admission rates. The increase was limited to the younger ages, where mental deficiency is the chief component of the Without Psychosis diagnostic group, and was concomitant with a 400-bed addition to the Ontario Hospital at Orillia which receives juvenile mental defectives.

Decreases in the first-admission rates of the diagnostic groups Psychosis with Organic Disease and Psychosis due to Syphilis are undoubtedly due largely to improvements in detection and early treatment of the diseases involved, particularly of syphilis.

V. Summary and Conclusions

1. First-admission rates to mental hospitals in Ontario during the years 1927 to 1946 were calculated by age, sex and diagnosis.

2. Total first-admission rates in Ontario, when standardized by age, did not maintain increases during the years from 1927 to 1946.

3. The cyclic trend of total rates was an approximate reversal of the employment curve and since it was essentially male first admissions aged 15 to 64, the wage-earners, who determined the cyclic pattern of the rates, the influence of economic factors is suggested. Whether the effect is upon the incidence of mental illness or upon the tendency to hospitalize the mentally ill is a problem deserving further investigation.

4. The first-admission curve for the segment of the population aged 65 and over is of particular importance since it is the only one which rose continuously over the 20-year period. Again, an attempt should be made to determine whether more people in this age group are becoming mentally ill or whether a greater proportion of the certifiable members of this group are being admitted to hospital.

5. There is some evidence that the major diagnostic groups tend to follow the admission trend of the age groups into which they fall.

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Bacterium Anitratum (B5W) Strains Isolated in Ontario

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OVER a period of three years a large number of strains of *Bacterium anitratum* (B5W) have been identified at the Central Laboratory of the Department of Health of Ontario. The biochemical and morphological characteristics of B5W organisms were described in 1948 by Schaub and Hauber, who suggested the name, *Bacterium anitratum*, on account of their failure to reduce nitrates; and by Stuart, Formal and McGann in 1949 under the designation B5W. The 15 cultures described by Schaub and Hauber are a definite biochemical group, whereas those described by Stuart et al. showed variation in the fermentation of lactose and rhamnose and in motility.

Schaub and Hauber described their strains as being mucoid and possessing a small capsule when first isolated. These workers found the encapsulated type to be serologically homogeneous. Stuart and his colleagues, however, found that their non-motile cultures were antigenically heterogeneous.

In 1949 Ferguson and Roberts confirmed the report of Schaub and Hauber on the encapsulation of mucoid strains but agreed with Stuart et al. that they were antigenically heterogeneous. They were able to demonstrate ten capsular antigens. However, their results indicated that more than 10 capsular types exist. An investigation was carried out on the determination of O antigens. In this paper a report is made on the occurrence and characteristics of the strains isolated in Ontario.

MATERIALS

Ninety-six cultures were examined by us in this study. Some of the cultures were isolated from specimens submitted to the Central Laboratory or our Branch Laboratories for bacteriological examination. Others were sent to us from hospital laboratories. Twelve stock cultures were received from Dr. W. W. Ferguson of Michigan for the preparation of antisera and comparative purposes.

The source of the cultures included in the group to be described and the distribution of the strains are given in Table I. Information as to the source was not obtainable for all of the strains. A wide variety of sources is indicated. Our cultures came from approximately the same pathological materials as those reported by Ferguson and Roberts (1949) and Marcus S. Brooke of Copenhagen (1950). They also found that a large percentage of cultures were isolated from urine specimens.

TABLE I

SOURCE OF ONTARIO CULTURES

Source	Number of cultures
Urine	32
Spinal fluid	4
Sputum	5
Blood	9
Throat	4
Faeces	3
Eye	3
Leg ulcer	4
Ear	2
Breast abscess	1
Foot abscess	1
Prostate	1
Fluid	1

Three of the four strains isolated from spinal fluid were from cases of meningitis in 5-day-old infants, one of which was fatal. All were isolated at the same hospital. One of the 9 strains isolated from blood culture was from a severely ill girl who presented a few features suggesting a meningococcemia. Another strain was isolated from the blood of a patient who died within 3 days of a fulminating septicaemia secondary to lobar pneumonia.

OBSERVATIONS AND RESULTS

Morphology and Cultural Characteristics

We observed that the majority of our freshly isolated strains were short, fat, coccoid, encapsulated and gram-negative when grown on solid media for 18 to 24 hours. However, a number of the strains were found to be a mixture of coccoid and bacillary forms. A small number of strains were quite pleomorphic, showing coccoid, bacillary and irregular, curved, filamentous forms. All were non-motile.

We were successful in demonstrating a capsule in all but a few of the strains. The crystal violet capsule stain described by Doctor Emmy Klieneberger—Nobel (1948) was used.

On tryptose or 1% glucose agar plates, well-isolated colonies are white, opaque, domed, smooth and glistening, with an entire edge. The cultures grow readily on MacConkey plates and triple sugar iron agar, but fail to produce either acid or gas.

A luxuriant growth and large capsule were obtained when the cultures were grown on tryptose agar rather than the 1% glucose agar recommended by Ferguson. Cultures were incubated in a moist chamber for 12 to 18 hours. A few cultures that were predominantly of the filamentous form reverted to the coccoid, encapsulated form when subcultured serially on tryptose agar.

BIOCHEMICAL STUDY

The biochemical reactions of the Ontario cultures are presented in Table II. The carbohydrate fermentation tests were made in Durham tubes containing 1% of the carbohydrate in peptone broth. All the cultures fermented arabinose,

TABLE II

BIOCHEMICAL REACTIONS OF ONTARIO CULTURES

Number of strains	Arabinose	Xylose	Rhamnose	Glucose	Lactose	Maltose	Sucrose	Dulcitol	Mannitol	Salicin	Citrate	10% Lactose
11	A	A	–	A	–	–	–	–	–	–	+	+
39	A^s	A^s	–	A	–	–	–	–	–	–	+	+
34	A^s	A^s	–	A^s	–	–	–	–	–	–	+	+
9	A^s	A	–	A	–	–	–	–	–	–	+	+
2	A	A^s	–	A	–	–	–	–	–	–	+	+
1	A^s	A	A^s	A	–	–	–	–	–	–	+	+
96												

A = Acid A^s = Acid produced slowly

xylose, and glucose without gas. Variable results in the length of time of fermentation were obtained in those three sugars. Eleven strains fermented arabinose, xylose and glucose in 24 hours, while 34 strains took 2 to 5 days to attack these sugars. Fifty more strains promptly fermented glucose while in 39 of these, arabinose and xylose were attacked after 2 to 14 days of incubation; in 9 strains, arabinose was attacked after 2 to 4 days and in 2 strains xylose was fermented after 2 to 4 days. Only one strain was a late rhamnose fermenter, the fermentation occurring on the 19th day. In all cases the fermentation of the carbohydrates was very characteristic; acid was first formed in the medium outside the inner tube, leaving the inner tube unfermented. The time required for fermentation to spread to the inner tube was variable. None of the cultures attacked lactose, maltose, sucrose, dulcitol, mannitol or salicin.

All the strains utilized citrate in 24 hours with the exception of 3 strains which required 2 to 4 days. The 10% lactose agar slants recommended by Chilton and Fulton (1946) for the identification of paracolon bacilli, were used. All strains gave a positive reaction in this medium in 24 hours. Two strains developed a one-plus reaction on Christensen's urea agar (1946) in 24 hours; the other strains did not split urea. None of the strains formed indole or acetyl-methyl-carbinol. Variable results were observed on methyl red, 68 of the strains being negative; 19 gave a weak positive reaction and the remaining 9 were positive. None of the strains formed H_2S on triple sugar iron agar. To test for nitrate reduction, Difco nitrate broth was used. No evidence was found of nitrate reduction by any of the strains.

Some difference of opinion exists as to whether these organisms liquefy gelatin. We have found one group of cultures, those reported here, that failed to liquefy gelatin within 7 days. Sixty-eight per cent of these cultures were held for 30 days or more. A second group typical of *B. anitratum* and agglutinating in B5W sera, liquefied gelatin within 1 to 6 days and two strains in 12 and 20 days. These are being held for further study.

Serology

Antisera were prepared from 10 of Dr. Ferguson's cultures in the mucoid phase. Rabbits were immunized by injections with the growth from 18-hour agar slope cultures killed by formalin. Agglutination tests were made by both slide and tube methods with living cultures. The tube tests were incubated at 50° C. for 18 to 20 hours as recommended by Ferguson (1949). Ferguson had observed that encapsulated organisms agglutinate with a disc-like clumping. We were able to distinguish this from the O agglutination, but, as Ferguson stated, it is difficult to determine the end titre of the capsular agglutination with any degree of certainty. The tube agglutination of Ferguson's 10 antigenic types of organism B5W with unabsorbed sera is presented in Table III. The strain numbers are used rather than the capsule type numbers 1 to 10, to avoid confusion. No distinction is made between the capsular and O agglutination in this table.

Our results were somewhat similar to Dr. Ferguson's, yet we did not find quite so many cross-reactions. This is probably accounted for by the lower titres we obtained in most cases. Higher titres were obtained when living cultures were used for injection. These sera were used in the identification of the Ontario strains, the majority of which agglutinated in one or more sera. Antisera were also made from a few of our strains which did not agglutinate in the sera prepared from the Ferguson cultures.

Absorbed sera were made by Ferguson's method (1949) for his 10 capsular types. This proved successful in all but two cases, B5W3 and B5W72. The results are presented in Table IV. A second rabbit was injected with the original culture B5W3 that produced a higher titre serum. Absorption with the strains recommended by Ferguson removed all agglutinins from the sera.

TABLE III

Unabsorbed Sera Made from Ferguson's B5W Strains

Antigens Strain Number	Sera									
	B5W 2	B5W 3	B5W 4	B5W 6	B5W 13	B5W 19	B5W 53	B5W 71	B5W 72	B5W 99
B5W 2	6,400	3,200	400	3,200	200	50	25	50	3,200	25
B5W 3	400	12,000	–	3,200	–	–	400	–	–	50
B5W 4	50	25	100	50	25	–	–	–	25	–
B5W 6	100	200	100	400	–	–	50	25	–	25
B5W 13	–	–	–	–	400	–	–	–	–	–
B5W 19	–	–	–	–	–	400	–	–	–	–
B5W 53	50	–	–	200	–	–	100	–	–	25
B5W 71	–	–	–	–	–	–	–	200	–	–
B5W 72	–	–	–	–	–	–	–	–	200	–
B5W 99	50	–	–	50	25	–	100	–	–	400

TABLE IV

RESULTS OF SLIDE AGGLUTINATION TESTS WITH ABSORBED SERA

Antigens Strain Number	B5W 2	B5W 3	B5W 4	B5W 6	B5W 13	B5W 19	B5W 53	B5W 71	B5W 72	B5W 99
B5W 2	++++	−	−	−	−	−	−	−	−	−
B5W 3	−	−	−	−	−	−	−	−	−	−
B5W 4	−	−	++++	−	−	−	−	−	−	−
B5W 6	± S	−	−	++++	−	−	−	−	−	−
B5W 13	−	−	−	−	++++	−	−	−	−	−
B5W 19	−	−	−	−	−	++++	−	−	−	−
B5W 53	± S	−	−	−	−	−	+++	−	−	−
B5W 71	−	−	−	−	−	−	−	++++	−	−
B5W 72	−	−	−	−	−	−	−	−	±	−
B5W 99	−	−	−	−	−	−	−	−	−	++++

S − Slow

The two unsuccessful absorptions are being repeated using a different combination of cultures for absorption.

DISCUSSION

The results obtained to date suggest that the age of the culture is responsible for changes in antigens. This might be due to a change in form from coccoid to bacillary or to the loss of capsule. Even though the capsule is lost, a certain amount of capsular material might still adhere to the bacillus. The question arises, has this capsular material the same antigenic composition as the envelope in which it was contained, or is it similar to the somatic antigens, or does it differ from both?

The type of media on which the culture is grown also appears to affect the antigenic composition. Differences have been noted when the same subculture has been transferred to tryptose slants and tryptose plates. This would indicate that the moisture content of the media affected the development of the capsule and in consequence its antigenic composition. A considerable amount of work is necessary on the antigenic structure of this group of organisms.

SUMMARY

A group of gram-negative, non-motile strains characterized by comparatively inert biochemical activity have been isolated in Ontario. Ninety-six of these cultures have been examined biochemically.

Unabsorbed and absorbed sera were quite successfully prepared from the Ferguson strains.

The properties of the Ontario strains are in agreement with the description given in recent years by other workers, of an organism which they designate as B5W or *Bacterium anitratum*.

The Effect of Repeated Injection of Dextran or Polyvinylpyrrolidone on Serum Complement in Guinea Pigs

CHRISTINE E. RICE, PAUL BOULANGER and E. ANNAU
Division of Animal Pathology, Canada Department of Agriculture, Animal Diseases Research Institute, Hull, Quebec

IN previous studies (1), we have shown that the repeated injection of gum acacia solution, one of the early plasma substitutes, will produce a definite fall in complement titre in guinea pigs. This decline was probably related to the disturbance in protein metabolism resulting from the storage of the gum in the liver and other protein-forming tissues for protracted periods (2–5). Hydrolyzed dextrans have now replaced gum acacia solutions as plasma substitutes (6–9). A synthetic colloid, polyvinylpyrrolidone (PVP), was used extensively in Germany during World War II (9, 10) and has been investigated experimentally elsewhere since that time (11). The characteristics of these newer plasma substitutes have been described in a recent review in this Journal (11). The plasma expansion produced by these various agents is accompanied by a temporary fall in its protein content (7, 8, 12).

In view of our findings with gum acacia solution, it seemed worthwhile to determine whether these newer plasma substitutes also have a deleterious effect on complement production since this might contra-indicate their use for transfusions in septic conditions in which full mobilization of the natural defence mechanisms of the body, including complement, is essential.

Experimental Methods

Two series of experiments were performed. In the first, three groups of three guinea pigs each were given 15 daily intraperitoneal injections of one of the following plasma substitutes: Intradex, a dextran from the Crooks Laboratories, London; Macrodex, a dextran produced by the Swedish firm, Pharmacia; and Polyvinylpyrrolidone (PVP), from the Abbott Laboratories. The guinea pigs were bled on the day after the sixth and fifteenth doses respectively. A corresponding number of normal untreated animals were bled at the same time.

In the second experiment, two groups of ten animals each received ten daily intraperitoneal injections of 10 ml. Macrodex or PVP. They were bled on the day following the tenth injection for plasma as well as serum.

Complement titrations were made on all sera in both experiments. The titres were expressed in 50-per-cent haemolytic units per ml. In the second experiment the plasma specimens were tested for coagulability by the modified

two-stage prothrombin method adopted in our other investigations (13). Protein determinations were made on a number of sera in both experiments by a fractional sodium-sulphate precipitation method.

Results

Complement Titres

The complement (C′) titres of both bleedings from the first series of guinea pigs repeatedly injected with Intradex, Macrodex, or PVP tended to be somewhat lower than those of the untreated controls bled on the same day (Table I). The C′ titres for the 21/12 bleedings from all groups including the controls ranged to lower levels than those of the 12/12 bleedings. The mean C′ titres for all treated groups were in each instance significantly lower (P approximately equal to or less than 0.01) than the mean C′ titre of the control animals bled on the same day. In the second experiment, the sera of the nine animals in the Macrodex group showed a wider variation in C′ titres, but neither for this nor the Intradex group was the mean C′ titre significantly lower than that of the untreated controls.

TABLE I

Haemolytic Complement (C′) Titres of Sera of Control U treated and Treated Guinea pigs

Expt.	Treatment of Guinea Pigs	No. of Doses	No. of G. Pigs	Date of Bleeding	C′ Titre (units/ml.)	
					Mean	Standard deviation
1	Untreated	0	4	12/12/51	1828	119
	Intradex	6	3		1370	111
	Macrodex	6	3		1330	165
	PVP	6	3		1263	73
1	Untreated	0	4	21/12/51	1315	143
	Intradex	15	3		870	53
	Macrodex	15	3		1017	36
	PVP	15	3		878	115
2	Untreated	0	9	7/2/52	1881	328
	Macrodex	10	9		1823	511
	PVP	10	10		1509	130

Plasma Coagulability

Repeated injection of either of the plasma substitutes Macrodex or PVP produced a considerable prolongation of the clotting time of the plasma as determined by a two-stage technique (Table II). The mean stage-I clotting times of the 1 : 25 dilution of plasma (without added fibrinogen) were significantly longer for both treated groups than that of the untreated guinea pigs. There was also a significant difference in the mean Stage-II clotting times (determined with added fibrinogen) of the treated and untreated groups. When prothrombin-free guinea-pig serum as well as fibrinogen was present (Stage-II modified), the clotting times of the Macrodex- and PVP-treated animals were somewhat shorter than in its absence, but the reduction was not sufficiently great in most cases to bring the values to the normal level.

TABLE II

MEAN CLOTTING TIMES OF PLASMA OF CONTROL UNTREATED AND TREATED GUINEA PIGS (EXPERIMENT 2)

Treatment of Guinea Pigs	No. of Doses	No. of G. Pigs	Clotting Time (sec.)					
			Stage I		Stage II		Stage II (mod.)	
			Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
None	0	9	196	19	69	11	69	9
Macrodex	10	9	256	43	116	34	96	39
PVP	10	10	307	42	110	11	105	10

Protein Determinations

Protein determinations were made on sera from 11 control untreated guinea pigs, from 11 Macrodex-treated, 3 Intradex-treated, and 13 PVP-treated. Of these, three sera in each group were from the 22/12 bleedings in the first experiment, the remainder from the 7/2 bleedings in the second experiment. The results are summarized in Table III.

TABLE III

RESULTS OF SERUM PROTEIN DETERMINATIONS ON SERA FROM TREATED AND CONTROL GUINEA PIGS

Group of G. Pigs	Non-Protein N mgm. %		Total Protein gm. %		Albumin gm. %		Total Globulin gm. %		A/G Ratio	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Control (11)	32.3	4.1	6.49	0.50	4.05	0.36	2.46	0.37	1.69	0.34
Macrodex (11)	36.9	5.2	5.72	0.54	3.44	0.57	2.28	0.45	1.50	0.36
Intradex (3)	30.5	0	5.37	0.35	3.74	0.30	1.72	0.08	2.10	0.15
PVP (13)	66.9	11.2	5.52	0.46	3.12	0.85	2.39	1.13	1.41	0.97

The mean total serum-protein values for the three treated groups were significantly lower than that for the untreated controls. The serum-albumin values of both dextran groups of guinea pigs fell within the normal range; the mean serum-albumin value for the PVP-injected animals was significantly lower than normal. The mean total globulin content of sera of the Macrodex and PVP groups of animals was comparable to that of the controls; the mean value for sera of the small Intradex group was significantly lower. There was considerable variation in the albumin-globulin quotient for sera of all four groups of animals including the controls but more particularly in the PVP group. The differences in the mean A/G ratios were not significant, however.

Non-protein nitrogen values for sera from the two groups of guinea pigs that had received 10 or 15 injections of either of the dextrans, were closely comparable with those of the control group. The non-protein nitrogen content of sera of the PVP-treated animals was significantly higher, the mean value being twice the mean of the control sera.

SUMMARY

The repeated injection of either of two dextrans, Intradex or Macrodex, or of polyvinylpyrrolidone resulted in some decline in complement titre but not more than might be expected on the basis of plasma volume expansion.

A significant prolongation of two-stage clotting times and a decrease in total serum-protein content was recorded which may also have been related in part at least to this dilution factor.

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Canadian Journal of Public Health

THE FORTY-SECOND ANNUAL MEETING

THE FORTY-SECOND annual meeting of the Canadian Public Health Association was held in the City of Quebec at the beginning of June, under the presidency of Dr. Théo. J. Lafrenière and in conjunction with the annual meeting of the Quebec Branch, La Société d'Hygiène et de Médecine Préventive de la Province de Québec. Almost five hundred delegates were registered. The program gave ample evidence of the vitality of public health and its ability to plan for the expanding needs of the health of the people. The meeting was admirably planned and conducted by the members of the Local Arrangements Committee. Dr. Paul Claveau as general chairman had the assistance of Dr. A. R. Foley, chairman of the Program Committee; Dr. Paul Parrot, chairman of the Registration and Finance Committee; Mr. L. Fontaine, chairman of the Rooms and Accommodation Committee; Dr. L. R. Vézina, chairman of the Reception Committee; Mr. A. Quévillon, chairman of the Transportation Committee; and Dr. A. Laberge, chairman of the Publicity Committee. The Association is greatly indebted to these members and to their associates, whose combined efforts made possible this most successful meeting. The generous hospitality of our Quebec confrères added much to the meeting. The Association extends particular thanks to the Honourable J. H. A. Paquette, Minister of Health and Honorary President, and Mme. Paquette, who graciously arranged a reception for the members and their wives preceding the annual dinner.

At the first general session the Hon. Dr. Paquette reviewed the progress of public health in the Province of Quebec. Dr. Paquette has directed the health program during the past fifteen years and has won for public health a place in the forefront of the Provincial programs. The advances are striking. Quebec's infant mortality rate has been reduced to half the rate of fifteen years ago. In 1946 the tuberculosis mortality rate was 85 per 100,000; today it is 19. In 1929 Quebec undertook the formation of county health units, and today the entire Province is provided with full-time services under the direction of public health authorities.

The meeting afforded the opportunity of paying tribute to the President, Dr. Théo. J. Lafrenière, who for more than forty years has directed the Ministry's Division of Sanitary Engineering. His achievements in sanitation

have been recognized throughout the continent. Another pleasing event of the meeting was the honour paid to Dr. Jean Grégoire, Deputy Minister of Health, by the health workers of Quebec and his many friends from other parts of Canada. Few public health leaders have made such an important contribution as has Dr. Grégoire.

As on former occasions when the Association has met in Quebec, important decisions were made concerning the Association's work. At this meeting the Association was able to report the completion of the organization of provincial public health associations across Canada. Each of these is related to the national association. It has long been recognized that the strength of the Association lies in the vital functioning of provincially organized associations meeting annually and providing the opportunity for full discussion of local problems. The national meeting will continue to provide the opportunity for the presentation of new work and the recounting of progress in Canada as a whole.

The First Canadian Medical Care Conference was held in conjunction with the annual meeting. An organizational meeting of the medical-care group was held during last year's meeting of the Association, and a committee was appointed consisting of representatives of the Ontario Blue Cross Plan, the Trans-Canada Medical Plans, the Canadian Life Insurance Officers' Association, the Department of National Health and Welfare, the School of Hygiene in the University of Toronto, and the Canadian Public Health Association. Although it was held at the same time as the Association's meeting, the First Canadian Medical Care Conference was independently planned and organized. Members attending the conference also participated in some of the Association's sessions. The success of the conference has encouraged the medical-care group to plan for a meeting next year. The holding of the conference at the time of the Association's annual meeting emphasizes the new era into which public health is entering and is a recognition of the close relationship of medical care to community health.

FLUORIDATION AGAIN ENDORSED

IT IS SIGNIFICANT that the Canadian Public Health Association and the Canadian Medical Associations, at their annual meetings in June, have endorsed fluoridation of public water supplies, where required, as a means of reducing the extent of dental caries in the child population. The report of the Public Health Committee of the Canadian Medical Association, under the chairmanship of Dr. G. M. Little of Edmonton, reviewed the evidence and voiced the conviction that by this procedure a substantial advance can be made in the effort to improve dental health and to minimize damage caused by caries.

Acceptance of the report by the Council of the Canadian Medical Association, and adoption by the Canadian Public Health Association of a resolution reaffirming confidence in fluoridation, should leave no doubt in the minds of Canadian citizens regarding the opinion of the professional groups who are responsible for health supervision.

The Canadian Public Health Association
1953-54
PART I

REPORT OF THE EXECUTIVE COMMITTEE

William Mosley, M.D., D.P.H.
Honorary Secretary

THE CONVENING of the forty-second annual meeting of the Canadian Public Health Association brings to mind other meetings of the organization in this historic city. At the time of our first meeting here, in 1916, the Association was facing serious difficulties, attendant on the outbreak of World War I. A considerable deficit had accumulated and the company which had been publishing the Public Health Journal had decided to discontinue its publication. Just before the Quebec meeting, a group of members undertook to provide several thousand dollars to ensure the continued publication of the Journal, if the Association at its annual meeting expressed a desire to continue and to plan for more effective support. It was at Quebec, therefore, that this crisis in the history of the Association was overcome.

In 1941 the Association again met in Quebec during world war conditions. In that year invaluable assistance was given the Association by its president, Dr. Jean Grégoire, Deputy Minister of Health and Social Welfare for the Province, whose enthusiasm and interest did much to assist the Association in meeting its commitments.

The 1947 meeting, held in Quebec under the presidency of Dr. A. Roger Foley, opened a post-war era of widened activity for the Association. At that meeting the Executive Council decided to proceed with the establishing of provincial public health associations across Canada and to make an extensive survey of public health practice.

Today the Association again meets in Quebec. The objectives of the past have largely become reality. In eight of the Provinces there is a Provincial Public Health Association, serving everyone engaged in providing public health services; the Association is furthering the training and recruitment of public health personnel; and the Journal, as the property of the Association, has become an outstanding publication in its field, stimulating the organization and extension of health services throughout Canada. The Association, although never free from financial problems, has been able to plan effectively for the accomplishment of its fundamental objectives.

Members of the Executive Committee welcome the opportunity afforded by this meeting of paying tribute to our President, Mr. Théo. J. Lafrenière. Mr. Lafrenière has been a member of the Provincial Ministry of Health, of

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Reports presented at the forty-second annual meeting of the Canadian Public Health Association, held in the Château Frontenac, Quebec, May 31-June 2, 1954.

which he is Chief Engineer, for forty-two years, and has long been active in the affairs of the Association. It is seldom that the Association has the privilege of having a public health engineer as its president, and it is fitting that we should honour Mr. Lafrenière, not only for his accomplishments in the development of sanitation in all its branches in his native Province, but also for his influence on public health in other parts of Canada.

As was intimated in last year's report, 1953 was the last year in which the Provincial Departments of Health made grants in support of the Association's work. Beginning this year, an annual account for services rendered will be submitted to the Provincial Departments, in order that they may assist more readily in the program of the Association. The services include the supplying of the Journal to public health workers; the recruitment of public health personnel; the work of the Committee on Professional Education in defining qualifications for public health personnel; the training program for sanitary inspectors; assistance in the work of the Provincial Public Health Associations; the annual national meeting; the Christmas meeting for laboratory personnel; and studies in various fields of public health. This plan has been accepted in principle by the Deputy Ministers of all the Provinces, and the details of its functioning remain to be worked out in only one instance.

During the past year, further progress was made in the organization and development of the Provincial Public Health Associations. In April, 1953, at the annual British Columbia Public Health Institute, a meeting was held to discuss the formation of a British Columbia Branch of the Canadian Public Health Association. At this meeting the establishment of a branch was endorsed and an executive elected. During the year, meetings were held by six of the Provincial Associations: La Société d'Hygiène et de Médecine Préventive de la Province de Québec, the Ontario Public Health Association (in conjunction with the national meeting of the Canadian Public Health Association), the Alberta Public Health Association, the Atlantic Branch (serving Nova Scotia), the Manitoba Public Health Association, and the New Brunswick–Prince Edward Island Branch. Dr. R. D. Defries and Dr. G. W. O. Moss attended the third annual meeting of the Atlantic Branch in Halifax, in June, and the third annual meeting of the Alberta Public Health Association in Calgary, in September. Dr. G. F. Amyot, Deputy Minister of Health and Provincial Health Officer for British Columbia, represented the national association at the Alberta meeting and participated in the program. In October, Dr. R. J. Wilson, Research Associate in the Connaught Medical Research Laboratories, attended the annual meeting of the Manitoba Public Health Association in Winnipeg, as the representative of the Canadian Public Health Association. In November, Dr. C. B. Stewart, Professor of Epidemiology at Dalhousie University, represented the Association at the annual meeting of the New Brunswick–Prince Edward Island Branch in Fredericton. The Executive Committee hopes to assist the Provincial Public Health Associations by providing speakers for their annual meetings. These arrangements would be greatly facilitated, and economies achieved, if several provincial meetings could be held within a relatively short period.

During the week of April 19, 1954, as part of the annual field staff conference

convened by the Saskatchewan Department of Public Health, a reorganization meeting of the Saskatchewan Public Health Officials Association was held in Regina. Those attending the meeting voted unanimously in favour of reorganizing the Association, and a new slate of officers was chosen. Dr. A. E. Chegwin was named president and Dr. M. S. Acker secretary-treasurer. The executive group has been asked to formulate plans for the Association. It seems probable that the annual meeting will be held in conjunction with the annual field staff conference, traditionally held during Easter week.

During Easter week the British Columbia Branch held a meeting at the time of the annual Public Health Institute, convened by the Provincial Department of Health and Welfare, and plans were made for a membership campaign. The Manitoba Public Health Association held its annual meeting in Winnipeg on April 15th and 16th. Meetings of the other Provincial Public Health Associations will be held during the fall months.

In keeping with the policy of holding the national meeting in conjunction with the Provincial Public Health Associations in turn, this Quebec meeting is being held in association with the Quebec branch, La Société d'Hygiène et de Médecine Préventive. Plans have been made to hold the 1955 meeting in Edmonton in conjunction with the Alberta Public Health Association and the 1956 meeting in Fredericton with the New Brunswick–Prince Edward Island Branch.

It is gratifying that, as a result of strict economy, the 1953 meeting, held in Toronto on September 30 to October 2 in conjunction with the fourth annual meeting of the Ontario Public Health Association, met expenses, even though a commercial exhibits section could not be arranged, as sufficient space was not available in the hotel. Social functions were curtailed in order not to embarrass the Association with a deficit. The attendance of almost six hundred delegates was most gratifying.

The twenty-first annual Christmas meeting of the Laboratory Section was held in Toronto on December 14 and 15, 1953, with an attendance of one hundred and twelve. Because it was necessary to pay for the use of meeting rooms on the first day, the meeting incurred a deficit of eighty dollars. On the second day the sessions were held in the lecture room of the Hospital for Sick Children, through the courtesy of Dr. T. E. Roy, chairman of the Section.

Members of the Association have followed with interest the introduction last year of three additional grants under the National Health Program, to provide better care for mothers and children; better health care for the disabled; and better facilities and services to help physicians in the diagnosis of their patients' illnesses. Of great importance also has been the extension of medical and public health research under the Public Health Research Grant. The provision of health grants in Canada in 1948 marked a new era in public health history in this country. The first five years of the National Health Program have been completed, and the value of the grants in advancing public health, and the provision of hospital facilities, is recognized by all health authorities. Through the combined efforts of local, provincial, and Federal authorities, and of the public, more than 46,000 additional hospital beds have been made available. Through the Professional Training Grant, bursaries have been given to

almost 5,000 health workers, including a large number of nurses. A remarkable increase in medical research has followed the provision of the Public Health Research Grant. This year the applications for support under this grant have greatly exceeded the funds available, in contrast with 1948, when only a small part of the grant was utilized. Equally striking evidence of their value can be presented for the remaining grants of the National Health Program.

At its meeting in Toronto on September 30, 1953, the Executive Council accepted with regret the resignation of Dr. J. H. Baillie as honorary treasurer. In his capacity as executive director from 1946 to 1950, Dr. Baillie contributed much to the Association, notably in the conduct of a comprehensive study of public health practice in Canada, in collaboration with Miss Lyle Creelman, and in the development of plans for the organization of provincial public health associations. Since his resignation as executive director in 1950, Dr. Baillie had continued to serve the Association in the capacity of honorary treasurer.

In the death, on March 20th, of Dr. C. P. Fenwick, chief medical director for Canadian Pacific Railways, the Association lost a former officer who had given generously to its work. In 1928, when the Journal became the property of the Association, he became secretary of the editorial board and served in this office until 1932. From that year until 1938 he continued his interest in the Association as honorary treasurer. For a number of years he was associated with Dr. Gordon Bates in the work of the Health League of Canada.

On behalf of the Executive Committee, I would like to express appreciation of the services of Mr. Randall in arranging for the annual meetings of the Association, the meeting of the Ontario Public Health Association, and the Christmas meeting of the Laboratory Section. In addition to his major responsibilities in the publishing of the Journal, he has carried forward the work of various committees and has directed the whole work of the Association's office. In the few months that she has been assisting in the office, Mrs. Joyce Howes has evidenced a keen interest in the work of the Association and the Journal.

REPORT OF THE HONORARY TREASURER

G. W. O. Moss, M.D., D.P.H.

THE FINANCIAL STATEMENT for the year ended December 31, 1953, shows an excess of revenue over expenditure amounting to $4,066.07, thereby reducing to $1,261.75 the deficit incurred during the previous year's operations.

Almost the entire budget of the Association is received from three sources: funds from the Dominion and Provincial Departments of Health for services rendered to them by the Association, Journal subscriptions and membership fees, and advertising. It will be noted that of the total budget of $33,093.82, almost one-third was derived from grants by the Provincial Departments of Health and the Department of National Health and Welfare. These grants amounted to $10,400 in 1953, as compared with $7,300 in 1952. The revenue from membership fees and Journal subscriptions totalled $9,137.40 in 1953, as against $4,803.43 in 1952. This substantial increase reflects the gratifying growth of the Provincial Public Health Associations during the past year.

The largest single item in the Association's budget is the cost of printing and mailing the twelve issues of the Canadian Journal of Public Health. In 1953 this totalled $11,559.25—well over one-third of the total expenditures—as compared with $12,082.25 in 1952. The net revenue from advertising was slightly less than in the previous year, $4,631.75 as against $5,119.25.

The Association's forty-first annual meeting was held in Toronto on September 30 to October 2, 1953, in conjunction with the fourth annual meeting of the Ontario Public Health Association, without incurring a deficit, even though it was not possible to have commercial exhibits. Expenses totalled $3,021.83 and receipts $3,333.25.

A deficit of slightly more than eighty dollars was incurred in the holding of the Laboratory Section's twenty-first annual Christmas meeting in Toronto on December 14 and 15. This was due largely to the fact that, for the first time in Toronto, charges had to be met for meeting rooms.

The operation of the correspondence course in sanitary inspection and the examinations for the Certificate in Sanitary Inspection (Canada) is provided as a service to health departments. Although small credit balances are reported, it should be remembered that the expenditures listed cover supplies only, and that no charge is included for salaries.

In an effort to achieve further economies in the central office, a rearrangement of the office staff was carried out last fall. Mr. Randall now has but one office assistant, instead of two. It has been possible to make an arrangement with the Association's auditors whereby the staff is relieved of part of the bookkeeping procedures, thereby making it possible for the routine work of the Association, including the publication of the Journal, to be carried by a staff of two. If the Association engages in any further work, or special studies such as the salary survey, allowance will have to be made for extra help.

As in past years, the Association was indebted to the director of the School of Hygiene, University of Toronto, for providing office space and other facilities essential to the work of the Association.

The audited statements for 1953 are appended. The Revenue and Expenditure Account differs from that of previous years in that, for certain accounts, total revenue and expenditure are both given, whereas in other years only the balance was entered as revenue or expenditure. A Comparative Balance Sheet for the past two years is also presented for the first time.

CANADIAN PUBLIC HEALTH ASSOCIATION

REVENUE AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST DECEMBER, 1953

SCHEDULE A

EXPENDITURE

Printing	$11,163.69
Postage on Journal and Mailing Cost	395.56
Honoraria	95.00
Salaries	8,104.17
Travelling	62.48
Committee on Memberships	149.46
Stationery and Office Supplies	595.87
Postage and Telephone and Express	490.64
Unemployment Insurance	76.16
Commissions Paid	551.25
Manitoba Public Health Association	72.30
Annual Meeting	3,021.83
Laboratory Section	677.95
Sanitary Inspectors—Examinations	592.23
Manuals	216.41
Correspondence Course	464.02
Reprints	1,563.14
Miscellaneous Expenses	300.23
Provision for Depreciation:	
Office Furniture and Equipment	187.99
Bad Debts written off	45.50
Discounts and Foreign Exchange	201.24
	$29,027.12
Excess of Revenue over Expenditure for the Year transferred to Surplus Account	4,066.70
	$33,093.82

REVENUE

Advertising		$ 5,183.00
Subscriptions—less Refunds		9,137.40
Grants—Dominion of Canada	$5,000.00	
Province of Ontario	2,500.00	
Province of Quebec	1,200.00	
Province of New Brunswick	900.00	
Province of Manitoba	400.00	
Province of Nova Scotia	300.00	
Province of Newfoundland	100.00	10,400.00
Annual Meeting		3,333.25
Laboratory Section		595.10
Sanitary Inspectors—Examinations		747.41
Manuals		340.69
Correspondence Course		1,500.00
Reprints		1,584.15
Interest on Investments		200.00
savings bank account		72.82
		$33,093.82

CANADIAN PUBLIC HEALTH ASSOCIATION

BALANCE SHEET
AS AT 31ST DECEMBER, 1953

ASSETS

Cash on hand		$ 50.00	
Cash in bank—Current	$ 3,435.09		
Savings	3,696.02	7,131.11	
Accounts Receivable	$ 3,663.72		
Less: Reserve for Doubtful Accounts	35.00	3,628.72	
Sundry Receivables		332.26	
British Columbia Branch—Advance		100.00	
Deposit with Postmaster		15.00	$11,257.09
Investments			5,000.00
Canadian Journal of Public Health		$ 1,000.00	
Office Equipment	$ 1,774.09		
Less: Reserve for Depreciation	1,774.09	Nil	1,000.00
Prepaid Expenses			398.63
			$17,655.72

LIABILITIES

Accounts Payable		$ 1,384.99
Prepaid Subscriptions		1,009.71
Surplus		
Balance as at 31st December, 1952	$11,194.32	
Add		
Excess of Revenue over Expenditure for the year	4,066.70	
Balance as at 31st December, 1953		15,261.02
		$17,655.72

Submitted with our report of this date attached.

TORONTO, Ontario
29th March, 1954

TESKEY, PETRIE & BURNSIDE
Chartered Accountants

CANADIAN PUBLIC HEALTH ASSOCIATION
COMPARATIVE BALANCE SHEET

ASSETS

	Dec. 31st 1953	*Dec. 31st 1952*	*Increase*	*Decrease*	*Net plus or minus*
Cash on hand	$ 50.00	$ 50.00	—	—	
Cash in Current Account	3,435.09	2,370.46	$ 1,064.63		
Savings Account	3,696.02	3,623.20	72.82		
Accounts Receivable— *less* Reserve	3,628.72	1,406.18	2,222.54		
Sundry Receivables	332.26	1,182.42		$ 850.16	
B.C. Public Health	100.00	—	100.00		
Postmaster	15.00	15.00	—	—	
Investments	5,000.00	5,000.00	—	—	
Can. Journal of Public Health	1,000.00	1,000.00	—	—	
Office Equipment *less* Reserve	—	187.99		187.99	
Prepaid Expenses	398.63	285.00	113.63	—	
	$17,655.72	$15,120.25	$3,573.62	$1,038.15	Plus $2,535.47

LIABILITIES

Accounts Payable	1,384.99	3,672.93	—	2,287.94	
Prepaid Subscriptions	1,009.71	253.00	$ 756.71		— 1,531.23
As per Revenue and Expenditure Account					$4,066.70

REPORT OF THE COMMITTEE ON MEMBERSHIP

G. W. O. Moss, M.D., D.P.H.

THE CANADIAN PUBLIC HEALTH ASSOCIATION carries the work of a national character for the members of the eight Provincial Public Health Associations who hold conjoint membership in the national body. The responsibility for the recruitment of members rests with the provincial body. This is desirable, as it simplifies enrolment and has the advantage of personal contact. The amount of the membership fee varies slightly from Province to Province. The sum of two dollars per member is required to finance in part the undertakings of the national office. An amount over and above this may be levied by the Provincial organization for its own work. In general, the fees are collected by the Provincial Association and forwarded to the national office.

On May 1, 1954, the Association had 1,158 conjoint members. The complete total for the year will be considerably higher, when the various Provincial Associations make further returns.

The Association has as its objective 2,000 members in the Provincial Public Health Associations, and it is hoped that this number may be reached in the next few years; in fact, the Association's budget is based in part on an enrolment of 2,000. Two encouraging developments of the past twelve months have been the formation of a British Columbia Branch in April, 1953, and, just last month, the reorganization of the Saskatchewan Public Health Officials Association as the Saskatchewan Public Health Association, with membership open to everyone in public health work.

EMPLOYMENT SERVICE

Assistant Medical Officer of Health: Applications are invited for the appointment of Assistant Medical Officer of Health in the City of Peterborough, duties to commence July 1, 1954, or as convenient. Starting salary $6,000 per annum, subject to adjustments according to experience. Submit application or request for information to Dr. J. P. Wells, Medical Officer of Health, City Hall, Peterborough, Ontario. 3-6

Public Health Nurse (C.P.H.N.) for generalized program in the City of Peterborough. Basic salary $2700 per annum. Annual increment $150. Transportation allowance or vehicle provided. Pension plan. Five-day week. Annual vacation one month, with additional time at Christmas and Easter. Address communications to Dr. J. P. Wells, Medical Officer of Health, City Hall, Peterborough, Ontario. 3-6

Medical Officer of Health required by the Muskoka District Health Unit. Apply in writing, stating experience, qualifications, and salary expected, to W. L. Litchfield, Secretary-Treasurer, Muskoka District Health Unit, Bracebridge, Ontario. 4-6

Simcoe County Health Unit has openings for one Public Health Nursing Supervisor and staff Public Health Nurses in a generalized public health program. Attractive salary and working conditions. Blue Cross available, Workmen's Compensation, and other benefits. For information or application forms, contact Mr. J. R. Coleman, Secretary-Treasurer, Simcoe County Board of Health, Court House, Barrie, Ontario. 4-7

Public Health Nurse for generalized program in Belleville. Salary $2,400-$2,900, with annual increase of $100. Allowance for experience. Employee benefits include Blue Cross, pension plan, sick leave, and 4 weeks' annual vacation. Apply to Secretary, Board of Health, Belleville, Ontario. 4-6

Public Health Nurses for generalized program. Minimum salary $2,600, with allowance for previous experience, and annual increments of $120. Cumulative sick-leave plan. Pension plan and Blue Cross plan available. Interest-free loans available for purchasing car if necessary. Liberal transportation allowance and holidays. Apply to A. E. Thoms, M.D., Director, Leeds and Grenville Health Unit, Victoria Building, Brockville, Ontario. 4-6

Sanitary Inspector. Minimum salary $2,700, with annual increments of $120. Cumulative sick-leave plan. Pension plan and Blue Cross plan available. Interest-free loans available for purchasing car if necessary. Liberal transportation allowance and holidays. Apply to A. E. Thoms, M.D., Director, Leeds and Grenville Health Unit, Victoria Building, Brockville, Ontario. 4-6

Public Health Nurses required for a generalized program in a rural-suburban health unit near Toronto. Starting salary $3,000 for qualified nurses, annual increments to $3,400. Pension plan. Car allowance. For full details write to Supervisor, Peel County Health Unit, Court House, Brampton, Ontario. 5-6